COMMUNICATIONS

TO THE

BOARD OF AGRICULTURE;

ON SUBJECTS RELATIVE TO

THE HUSBANDRY,

AND

INTERNAL IMPROVEMENT

OF THE COUNTRY.

VOL. V. PART I.

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No. I.

An Account of the Moss Improvements of John Wilkinson, *Esq. of Castlehead in Lancashire. By Sir* John Sinclair, *Bart. M. P.*

HAVING heard much of Mr. Wilkinson's moss improvements in Lancashire, and being desired, by that spirited agriculturist, to examine them upon the spot, I was tempted to quit the line of the great Western road from Edinburgh to London, and from Kendal to go to Castlehead, a place situated on that arm of the sea which divides the district called Furness, from the rest of Lancashire. It is well known, that the sea overflows there an extensive tract of country, which Mr. Wilkinson and some other friends to improvement, would gladly have rescued from its present miserable state; but however practicable the plan was considered to be, yet various obstacles of a legal, a local, and a personal nature, have hitherto prevented its being carried into effect.*

On approaching Castlehead, the appearance of the country denotes, that a spirit of improvement could only have been recently introduced into it. The roads are in some places very steep, going over the ridges of hills, instead of being conducted round them. Large tracts of moss land are seen in a state of nature. The fields,

* In the general view of the agriculture of the county of Lancaster, published by the Board of Agriculture, anno 1795, there are some interesting observations on the embankment of Lancaster sands, from which it would appear, that at an expence of from £150,000 to £200,000, about 38,710 acres might be recovered from the sea, which are of no value in their present state, but which, if improved, would soon become worth £1,348,400. Mr. Wilkinson offered to subscribe £50,000 for carrying on this great national undertaking.

whether inclosed for grass, or cultivated by the plough, (at least so far as it is possible to judge from their present appearance,) are in much the same state that they probably were a century ago.

Mr. Wilkinson was originally led to think of acquiring any property in that neighbourhood, with a view of making iron from the peat with which the country so much abounded. But as that mode of manufacturing iron was attended with great disadvantages, from the quantity of fuel required, and the difficulty of procuring it in sufficient quantities, more especially in rainy seasons, he was thence led to give up that attempt,* and to consider what other uses could be made of so extensive a tract, in particular whether it could not be made capable of cultivation.

Nature of the Moss.—Nothing could be more discouraging than the general nature of the moss he undertook to improve. It was what is called in Scotland, "*a flow moss.*" On an average, about 5 feet of it consists of a soft spongy light kind of peat, which makes very weak and bad fuel. Below that stratum, the peat is black, and of excellent quality. The depth of this second stratum is very great, in many places 15 feet and even more. The bottom, where it can be got at, is a fine, strong, blue clay, which is unfriendly to vegetation until it has been long exposed to, and ameliorated by the atmosphere. Calcination in small heaps with peat, fits it for a top dressing on grass lands, or this kind of clay, might be made very useful, by ploughing it in, mixed with lime. In the moss, considerable quantities of old trees are found, principally oak and fir, and often in such a state of preservation, that they can be used for various purposes. They seem all to have been thrown down by the force of some violent tempest, by a general or partial deluge, or by some great convulsion of nature.

The moss, in its original state, was so spongy, that since it was drained, it has subsided considerably, and in some places has sunk from 3 to 4 feet.

Original Value.—From this account of the nature of the moss, it can hardly be said to have had any original value whatever, excepting for fuel. The liberty of pasturing on such land, (which could only be done in frosty weather), has been

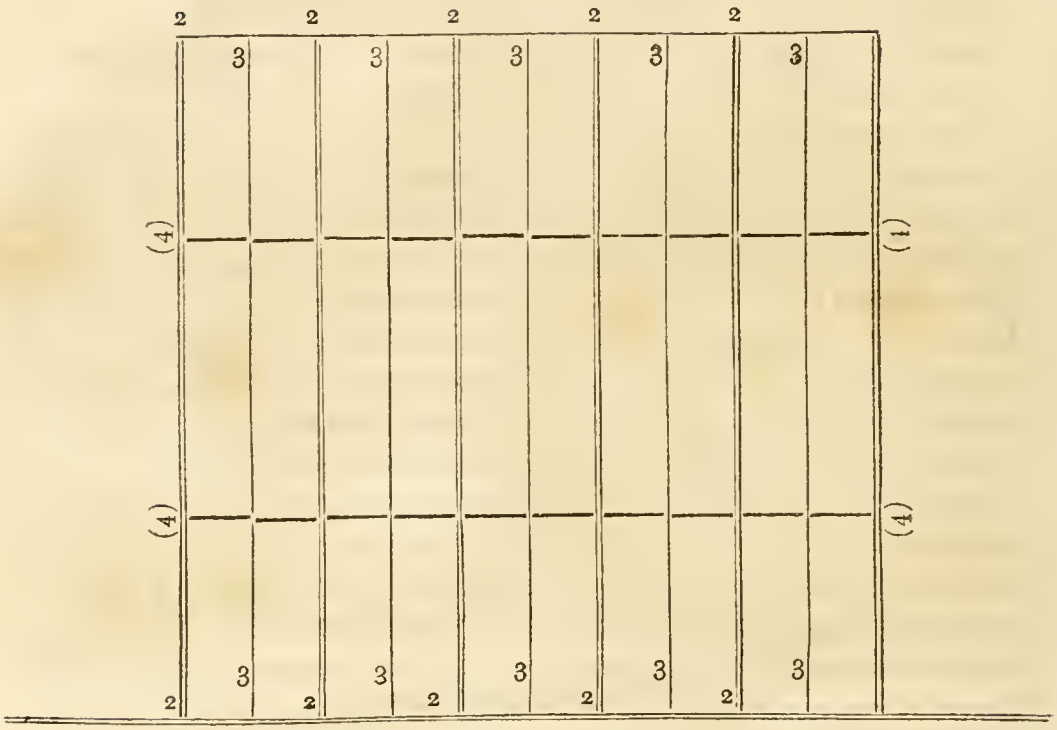
* The idea of making iron with peat, ought not to be totally given up, as it may answer in some places, where labour is cheap, and the climate drier than Lancashire. Mr. Wilkinson tried it in 1778, and found the metal was worth, for certain uses, from £3. to £4. per ton more than common iron; but the expence of the fuel was so great, and the procuring of it in sufficient quantities so uncertain, that he was obliged to abandon the scheme.

offered for so small a consideration as three halfpence per acre, but nobody thought it worth their while to take it even at that rate. A penny per acre therefore is a high estimate, for heath only to be come at during a long frost.

Plan pursued.—The first attempt to improve any part of this tract, was anno 1778, when some general drains were made, but being cut at too great a distance from each other, the moss was not rendered sufficiently dry. The scale of cultivation, when first attempted, was small, only to the extent of about 4 or 5 acres. The system pursued was as follows. The surface was breast-ploughed, and then burnt. Sod kilns were erected to burn lime to be spread on the moss, the surface of which had been thus cleared off. But the plan did not answer, as the proper management of these kilns was not then understood. It was necessary therefore to follow a different plan, the particulars of which it is proper next to detail.

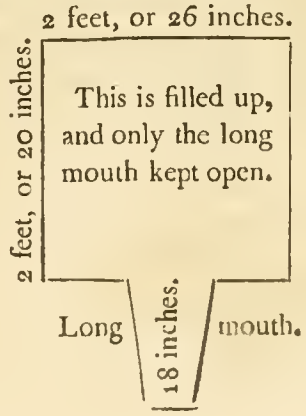
Drainage.—It is in the first place essential to make a sufficient number of *large open drains*, both to carry off the stagnate water, and to promote a consolidation of the moss. There must also be *covered small drains*, made with sods, which have been dried for about three weeks or more, according to the season. In soft spongy moss, the covered drains ought to be at first 9 yards distance, and when the moss is consolidated, covered drains must be made, first between, and afterwards across the covered drains that are first made.

The following sketch, will explain the nature of the system that has been found to answer best. No. 1 denotes the open main drain, or division fence; No. 2, the first covered drains, at 9 yards distance; No. 3, covered drains made between No. 2, or at $4\frac{1}{2}$ yards distance, and executed about two years after No. 2. No. 4 are covered drains quite across the field, and are made when the moss is pretty well settled. They should be from a foot to 18 inches below or deeper than Nos 2 and 3, and if properly placed, will complete the solidity of the moss.



(1) The main drain or division fence.

The drains marked No. 2 are from 2 to 3 feet wide, and 2 feet deep. These drains lay open sometimes for a year. The sods are dried for covering the long-mouthed drain, as it is called, which is 18 inches deep, and 4 inches wide at the bottom. The nature of this sort of drain will appear from the following sketch.



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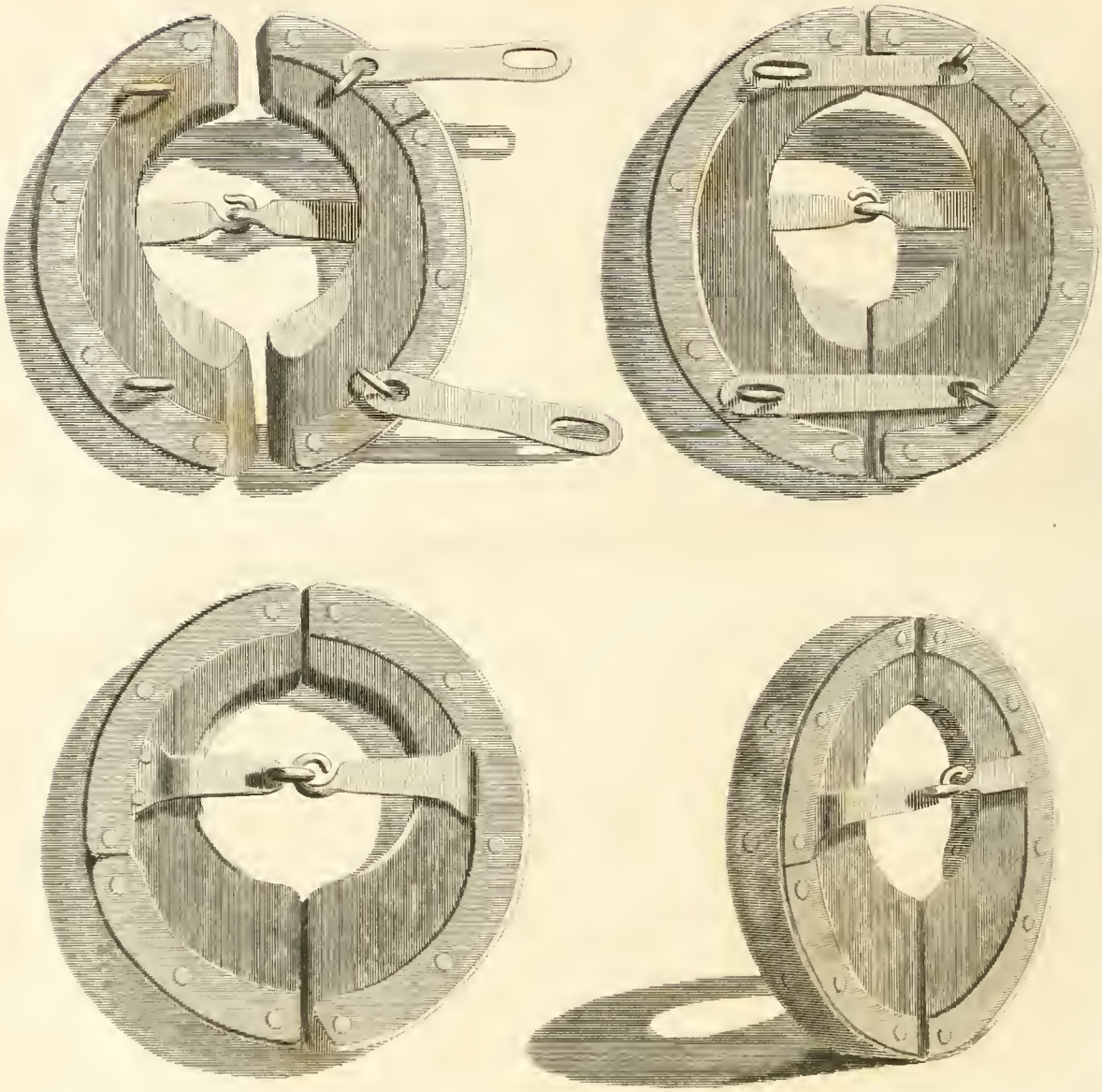
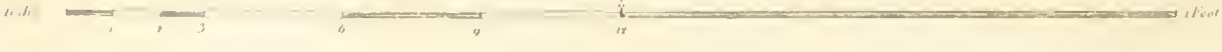
Mr Wilkinson's Horse-Fetter.





Needp. 552, Journal

It is imagined by some, that moss land can be made too dry, but that has not been found to be the case at Castlehead. The moss being so deep, there always comes a damp from it, which keeps the land moist enough.

Roads.—Next to draining, roads are essential, and Mr. Wilkinson has been extremely successful in making them good over the very softest moss.

Instruments used.—The first instrument to be mentioned, is called *a tom spade*, used for cutting the drains. The second a plough, of the nature of the common swing plough, but the coulter is steeled, and the sock, which is 14 inches broad, is also steeled, and both are kept quite sharp. This instrument will not do so much work as the Cambridgeshire fen plough per day, but being simpler in its construction, it is better calculated for general use, more especially in a country, where such improvements are to be introduced. With this plough they can cut as thin as an inch.

Besides this plough, an instrument has been contrived for cross cutting the surface previous to its being ploughed, which is of great service, by dividing the sods into small pieces, and making them either more portable, or fitter to burn.

The only other peculiar instrument is a *horse patten*, to be used when the moss is soft. Pattens are not necessary for the fore-feet of horses, but are often required for the hind feet, more especially when the moss is first ploughed. After many trials, a patten of a circular form has at last been hit upon, which answers the purpose effectually. Perhaps a similar contrivance might be of use for oxen, or for horses with bad feet.* Before this invention, the ploughs were wrought by the strength of men till the moss had consolidated.

Rotation of Crops.—Before the land can be laid down with grass seeds, the following plan, after the draining, and other previous operations have been completed, is pursued. *First year*, burn the heath, with any hillocks which were cut off in order to make the surface plain, and fit for ploughing. Plough the moss 7 inches deep; then cover it with clay or sand, or mould, (1000 single horse carts per Lancashire acre,) as any of these articles may lie most convenient for carriage, which is the point to be principally attended to. This year turnips may be sown, if the season and other circumstances are favourable. *Second year*, after a slight ploughing, sow oats, and the crop will in general be excellent. *Third year*, another slight ploughing, burn any clods that may appear, and lay down with turnips in

* Having brought with me a pair of these pattens for the inspection of the Board of Agriculture, it was thought proper to have a drawing of them engraved, to be annexed to this paper.

drills. *Fourth and fifth years.* Then a fourth ploughing for another crop of oats. When the oats are cut, spread a light compost over the stubble, and after a slight ploughing, sow winter rye, which always produces a good crop,) and in April, when the frosts are over, sow grass seeds on the winter rye, and roll them in. The land is thus brought into grass, in perfect good order, and may be pastured with much advantage for five or six years, when the grass may be renewed, without ploughing up the land again, by which the drains might be disturbed.

The advantage of this succession is, that you are pretty certain of four or five good crops, (two of oats, one of winter rye, and one or two of turnips,) which will pay a considerable share of the expense of the improvement.

Besides these crops, barley has been tried, and answers well; and the potatoes raised on mossy land, are of a quality peculiarly excellent.* Coleseed would certainly produce good crops.

Expense of the above Process. — No particular estimate has hitherto been made of the expense. The covering, at the rate of a 1000 cart loads per Lancashire acre, may be calculated at £8. 15*s.* or 2*d.* per cart. The expense of draining, making roads, &c. must depend upon various circumstances.

Kind of Oat. —The best kind of oat, for the first crop, is the Scotch dun, or the *Nanny pye oat.* Afterwards a heavier sort may be tried.

Grass Seeds.—Red clover does not answer, and the land, when laid down to grass, produces white clover of itself. The following has been found the best proportion of grass-seeds, 10lb. of trefoil, 10lb. rib-grass, and 6 bushels of hay-seeds.

How to renew the Grass. — In the course of five or six years, the grass is very apt to get foggy. It may be renewed by the following process. Spread, at the rate of 40 Lancashire, or 120 Winchester bushels of hot lime, per Lancashire acre, and as hot as possible, in the month of July. Immediately after liming, run it over with a short sharp-toothed harrow. The hot lime and the sun will destroy the fog, and new and finer grass will spring up.

What Manures.—Neither lime nor dung had any material effect upon the moss, till it was reduced to soil. The stagnate water in moss, called in Lancashire *aidle water*, is highly pernicious, and is injurious to animals that drink any water with

* It has been remarked at Castlehead, that potatoes are very apt to become curled, either if they are taken up too early, before they reach maturity, or if they have not been properly kept, and if the shoots come out, which weakens the plant.

which it is mixed. By ploughing the moss often, exposing it to the influence of the atmosphere, and mixing it with other substances, the *canker*, as it is called in some districts, is extirpated. The frost has a great effect in reducing moss to soil, and after the moss is frosted, the influence of the sun is beneficial. The moss must be rendered dead matter, before it can become productive. Lime has then an effect, and dung still more. But nothing has answered better than burnt clay. Low-canal field, containing about 4 acres, was manured with burnt clay at the rate of 80 single horse carts per Lancashire acre. It has ever since been mowed annually, and is the best meadow land for hay in the parish.

For turnips, the burnt ashes answer particularly well, and it has been observed, that the fly never attacks the turnips where they have been manured with ashes, more especially if the seed has been pickled as wheat usually is, previous to its being sown.

Shelter.—Birch, alder, plane, black poplar, and mountain ash, thrive well on mossy lands, and if where quicks are planted, the moss is properly mixed with clay or sand, they will also thrive well.

Grass, how managed.—The land must at first be tenderly dealt with, and it is in general much better to pasture than to mow it. Sheep have not been tried. The highland sorts are much liked, both as they are light, and feed quickly: but the Galloway are on the whole preferred, being tamer and doing less mischief. Sometimes young cattle from the neighbourhood are taken in to graze, and that plan pays well.

Present Value.—For pasture, in its present state, the new improvements would let at from 30*s.* to 40*s* per Lancashire acre, and the land that was improved some years ago, at double that sum.

Extent of the Moss improved.—Mr. Wilkinson has already improved, or is in the course of bringing into cultivation, no less a quantity than about *five hundred Lancashire* acres of this kind of soil.

Conclusion.— Such is the substance of the information I was able to collect, regarding this great improvement, which, considering the unproductive nature of the moss, the expense necessary to improve it, and the success with which it has been attended, can hardly find a parallel in any part of the united kingdom.

Narrow minded and ignorant people, I understand, have endeavoured to decry

this great and important attempt. They say, that Mr. Wilkinson might have bought, at a cheaper rate, the best land in Lancashire. Perhaps so. But Mr. Wilkinson must derive much higher satisfaction from the plan he has pursued. By so doing, he has furnished employment to numbers of industrious people:—he has raised great quantities of food for man, where nothing, but for his exertions, would have been produced:—he has shewn a noble example to his neighbours if they choose to follow it;—and by augmenting the value of 500 acres of a barren waste, from 2*d.* to 30*s.* per acre *and upwards*, not merely for a few casual crops, but on the principles of substantial and permanent improvement, he is justly entitled to be ranked among the best friends to the agricultural interests of the country.

London, 25th April, 1805.

APPENDIX.

The Author of the above Paper has, for some time past, been carrying on some very extensive improvements on mossy lands in the northern parts of Scotland, a short account of which he drew up in September, 1804, which was printed in some periodical publications, and which it may not be improper to annex, by way of Appendix to the preceding Paper, together with some observations by an intelligent and experienced farmer, Mr. James Anderson, of Ausdale, in Caithness, on the Means of improving mossy Lands by means of Frost.

On the Improvement of mossy Lands on the Estate of Langwell, in the County of Caithness, North Britain.

I THINK it right to communicate to the public, with as little delay as possible, the result of some extensive experiments on the improvement of mossy lands, which have been carrying on in this neighbourhood, as it may furnish some hints to those who may be desirous of bringing the vast tracts of that description of soil, with which Scotland abounds, into a state of cultivation.

It was in the year 1802 that I first attempted the system pursued in the fenny

districts of the eastern coasts of England, namely, Cambridgeshire, Lincolnshire, and Huntingdonshire. The experiments were not at first successful. They were tried on mossy lands on the sides of hills; whereas the English fens were flat, had been covered for ages with water, and are only preserved from inundation by art. After bringing, therefore, a number of ploughmen from England, and the various instruments of husbandry used in the fens, I found very little prospect of success. Determined, however, to persevere, I thought it advisable to try the same plan next year, but on a smaller scale.

I began the year 1803, therefore, with only three Englishmen. A considerable tract of ground was prepared by them, according to the fen system, and laid down with rape, with grain, grass-seeds, and other crops; but the prospect, even the second year, was not much better than the first. The corn was stunted in its growth, and unproductive; the rape thin, and the grass unpromising. I dismissed, therefore, two of the Englishmen, and reduced the establishment to one, who was to receive the occasional assistance of the neighbouring cottagers.

The third year, however, has removed all doubts of ultimate success in this important undertaking. Several acres were laid down in spring, with bear, oats, grass-seeds, and rape, all of which have answered; in particular, the bear and grass. The rape sown in autumn 1803, though rather thin, yet stood the winter frosts, was harvested in August last, and produces seed equal to any imported from England. It is pleasant to observe such crops on the summit of a hill, at least three hundred feet above the level of the sea.

The cause of this success it is next proper to explain:

Dr. James Anderson, in a work intitled, "*A Practical Treatise on Peat Moss*," printed in 8vo. anno 1799, is the first author, with whose writings I am acquainted, who made the distinction between *quick* and *dead* moss. Whilst it is quick or growing, it cannot afford food for other vegetables, being a vegetable, or a combination of vegetables itself. It is necessary, therefore, to convert it into *dead* moss, before it can be productive.

The fen plough, for paring the surface merely, is the best instrument ever invented for that purpose, but it is not calculated for raising the *quick* moss, under the surface, and converting it into soil. Mr. Anderson, who rents a considerable farm called Ausdale, in this neighbourhood, was the first who observed this defect, and who recommended it to William Carter, the remaining Englishman, to plough

deeper, before he attempted to crop the land. Mr. Anderson had some experience in the cultivation of mossy lands in Strathnaver, where he had resided several years. He knew the beneficial effects of deep ploughing, and of exposing moss to the influence of frost, by which it is converted, not only into a fertile soil, but even into a manure, well adapted for light or for clayey lands. It is, however, particularly to be observed, that exposing a mossy soil to the influence of the sun, or ploughing it during the summer season, does mischief, drying up its moisture, and changing it into peat for fuel, after which it is almost proof against the effects of frosts; whereas, the more it can be exposed to frost, the better; as it is thus changed from *quick*, into *dead* moss, and fertilized at the same time. Hence, it appears, that the mosses, which are so gloomy and so unpleasant to look at in their original state, and the abundance of frost, which so many object to in the climate of Scotland, may become sources of fertility and riches.

I shall now briefly detail, what appears to me the best system, for converting mossy land into a productive state, and by means of which considerable profit may accrue to those who will engage in so useful an undertaking.

Preparation.—Begin with draining the land, so as to put it in a state fit for being ploughed, without rendering it at the same time too dry. Burn the heather; then make use of the fen ploughs for paring the surface. What is pared off, may either be made into turf walls, for sheltering the ground, or employed to fill up the hollows, or burnt, though the ashes of the surface are in general so light, as to be of very little service as a manure. When the surface is cleared, then take a common Scots plough, and during the months of September and October, and all the winter months, whilst it is practicable, plough the moss from six to nine inches deep, exposing it as much as possible to the frost. The frequent use of the roller (and the heavier the better) is of the greatest importance in the cultivation of moss, rendering it much sooner capable of producing abundant crops of grain or grass, than otherwise could be expected, and effectually banishing that noxious weed *sorrel*, with which it is otherwise apt to be overspread.

Manure.—In the following spring, the land thus prepared, will be fertilized by the frost, and easily converted, by harrowing, into mould, or what Dr. Anderson calls *moss-earth*. If any clods are to be found in a rough state, they ought to be burnt; and, if the season is dry, fire may be spread over the surface, the ashes immediately harrowed in, and the ground sown. Dung, lime, clay, sand, or

small gravel, may also be employed as manures, as circumstances will admit of it.

Crops.—Bear seems to thrive on lands thus prepared. Oats also would answer well. Rye would probably succeed. Rape would certainly be productive. Red clover has not yet answered, but will most probably succeed, when the lands have been longer under cultivation. Rye-grass, and the grass called *Yorkshire fog*, seem to answer particularly well.

Succession of Crops.—It has not yet been ascertained by experience, what is the best succession of crops, in such lands, but the great object certainly is, to get them laid down into grass as quickly as possible. They can then be broken up with the fen plough, the surface burnt, and the quantity of rich ashes which the roots of the grass will produce, will ensure a succession of abundant crops, for at least three years, of which, two may be of grain, and with the last crop of grain the land may be again laid down to grass.

CONCLUSION.

There is every reason to believe, that by following such a system, the extensive bogs in England, Scotland, and Ireland, may be rendered fertile, and a great addition made to the wealth of the country, and the subsistence of its inhabitants.

Berriedale Inn, Caithness, 13th Sept. 1804.

Observations by Mr. James Anderson, *of Ausdale, on the preceding Paper.*

Addressed to Sir John Sinclair.

I AM too deficient in the knowledge of natural philosophy, to comprehend the injurious effects that moss has on an atmosphere, or making a country unwholesome; but I am certain, from an experience of near thirty years, that the men, cows, horses, and sheep, who live in the mossy districts of Scotland, enjoy as much health and vivacity, as those who reside in the more cultivated parts of the kingdom. No doubt, the former experience a greater proportion of *frost*, owing to altitude, and

the attraction of much surface water; but they neither find, or believe, that frost hurts the salubrity of their atmosphere.

I will not pretend to argue, respecting the propriety of the terms, *quick* and *dead* moss, which some may object to: they answer the purpose very well, by understanding them in the same sense that Dr. Anderson has affixed to them; and when it is admitted that moss will continue to grow and increase, until dug up *and broken*, it may be allowed to enjoy the pleasures of vegetable life.

It is contended, that soil is never properly formed from an adhesive moss, until the third year after it is broken up; and upon that data the success of your experiments the third year is attributed; which, upon the supposition that your operations had been properly carried on from the commencement, was a rational conclusion.

The success in question was not greater, though sufficient to show, what may be expected; but it is those only who know the mode of cultivation practised, that can *properly* account for it. And though I concur with those who contend that three years (*at least*) is necessary to reduce growing moss into a proper soil, yet if they will be pleased to visit your farm of Carterfield in August next, they will probably see a tolerable crop upon moss, that has been broken up since last November; though to be sure not equal to what a more perfect cultivation will produce; and for this same *expected crop*, we depend in a great measure upon the effects of *frost*, which some consider as insignificant; and a little *burning*, which others totally condemn.

It is said that there is no impropriety in ploughing up growing moss in summer, so as to obtain the benefit of the summer drought and sun, for reducing it into mould or soil: so much do I differ in opinion, that were I under the necessity of performing the operation in that season, I would think it highly necessary to follow my plough, with a break harrow and roller, so as to prevent that benefit; at the same time I allow, that moss broke up to a sufficient depth the preceding harvest, or winter, and which may be supposed to have got frost, may very safely, and with great propriety, be wrought with both plough and harrow in summer; because once thoroughly *frosted*, all the sunshine in Jamaica will not afterwards bring it to the consistence of real peat.

It is said that "a peat not uplifted will be reduced to mould in a season." This may be so far true; but if we examine that mould attentively, we will find it feel

between our fingers, like the sawings of timber, and not that impalpable saponaceous substance which forms the basis of good vegetable earth: nay, so far is real dry black peat removed from such a state, that I apprehend no ordinary process applicable to a field, in ordinary time, but that of burning, can bring it to support vegetation to advantage.

It is contended, that "if frost alone formed the soil, every moss would have a "soil on it of sufficient depth, as the frost penetrates the moss more than a foot "deep every winter." I do not say, or think, that frost alone is sufficient to form moss into proper vegetable earth, because I know that before it can become such, it must undergo a degree of *fermentation*, which operation requires *heat*; but I affirm, that before the sun heat *alone* can produce fermentation upon moss, it must be previously *frosted*; and the opponents of this doctrine should know, that it is owing to the primary effect of the frosts penetrating the surface of our mosses to a certain depth every winter, that we enjoy all the fine heath, and other horizontal rooted herbage, which now yields such *fine rents* to the proprietors of that otherwise cold, torpid, sterile part of the creation; and therefore no wonder, that you in particular should ascribe much to the effects of frost upon moss.

Some do not approve of destroying the surface of moss by fire, thinking it might be used to better purpose, to convert it, with its herbal contents, into soil; and that is right, in so far as the nature of the surface, does not forbid that mode of culture; but circumstances alter cases. The surface of your Carterfield moss in general, resembles a composition of light yellow fog, for about six inches deep, which we wish to get rid of with all possible expedition, in order to get at better stuff, and therefore *burn* that surface. But when moss surface is found of a more substantial texture, and that the improver has the command of dung, lime, or sand, &c. he may advantageously bring such into culture without burning; but hitherto you have had no such advantage.

The plan of reclaiming moss by planting potatoes in the lazy bed way, is the general practice all over the West Highlands, and it is almost incredible what heavy crops of barley and oats succeed; but this system can only be carried on upon a small scale, and never without dung, lime, sand, or sea-weed.

Many consider it impossible to burn a field of any extent, previous to the season for sowing it; but they may be assured, that in a dry March day, thirty or forty

women and children, with hand-rakes, will go over a great many ridges, collecting the clods and building them up in smal heaps, in which position there is no doubt of their being sufficiently dry before the season for sowing bear or barley comes on, which we hold to be from the 20th April to the 30th May; nor is there any danger of rendering the soil too dry by such a burning operation. It is impossible, indeed, to bring moss to produce a fair crop without it, if circumstanced, as you are, without the aid of dung, lime, or any other kind of manure.

No. II.

A Plan for improving the Growth of Tares. By Mr. Thomas Herod, *of North Creak, Norfolk.*

To be sown broad-cast in October, from ten to twelve pecks per acre, with one peck of *wheat*, then ploughed into four-furrow ridges. In the months of April and May, a one horse plough (double breast) is to be run through the furrows; this will keep them clean, and admit the air to the roots of the tares, and will keep them green and growing till Midsummer.

Observations.—Tares being found very useful for the soiling of cattle, and the best plan of growing them being required by the Board, I submit one for their consideration which I have practised seven years with success. They are a plant that contain a great deal of moisture, particularly when young, therefore it is not proper to soil cattle with them in that state without dry food; those persons who are destitute of that must give them very *sparingly*, or they injure their stock more than they are aware of. On the general plan of sowing, soon after they are at an age proper for the stock, they begin to rot at the bottom; to obviate which, some people sow rye, some oats, and some barley, the stems of the latter being weak, of course they can have no effect: the former soon get hard and the cattle refuse to eat them, and by endeavouring to avoid them destroy many of the tares, treading them underfoot: therefore on that plan they cannot be grown to so great advantage as might be hoped for. If it had been considered that *air* is the most essential means of the life both of the animal and vegetable creation, a different plan would have been resorted to. It is well known, that tares grow so close together at the tops, as to exclude all the external air from the bottoms, and although they keep green at the tops where they receive the air, they continue rotting at the bottoms for want of it. When they are cut for soiling, the stock refusing to eat the decayed part, destroy a great deal of the sound food: the loss to the growers of this plant therefore is not to be calculated! My first attempt of improvement was on two roods of ground for the soiling of two horses, sown as first stated, and ploughed into four furrow ridges; they continued growing with rapidity to the height of near five feet

clinging to the wheat. A high wind took them about Midsummer, and bent them all down, but not close to the ground; some yards might be seen up the furrows, which appeared like an arch. These furrows admitted the *light* as well as the *air*, which is also a means of preserving the plants green, for if *air* is admitted and *light* taken away, they may continue growing, but they will lose their colour. These two roods produced more than my two horses could eat; after Midsummer the remainder were cut, and produced half a load of excellent hay. This land is a sandy soil upon a gravel; six loads of farm-yard dung were ploughed in with the tares. Last year and the preceding year, I had two roods on a black gravel, sown on this plan, had no other manure than a thin covering of mould from an old bank in the same piece; the first crop was but middling; I gave it another thin covering of mould from the headland of the same piece last year, as the ground was weak. I sowed six pecks of tares, and three quarters of a peck of *wheat*; this proved a *good* crop, and after soiling two horses with them from the end of May till the middle of August, half a load were cut for seed. I have always found that two roods of tares sown on this plan were *more than two horses could eat.* I am well convinced from my own practice, that tares sown on poor land will improve it, if repeated a few crops; they may also be grown to great advantage, if sown on this plan, as the food will not only be sound and sweet, but also much greater in quantity. It has been supposed that they would be inconvenient to cut on the ridges; but, I believe, they may be cut better, than when they are fallen close to the ground and rotten. The reasons for my sowing *wheat* among the tares, are, the stems of the wheat are not only strong and hold the tares up, but they are also so sweet that the stock will eat them with as much avidity as they do the tares, and to as late a time as the tares are proper to be cut for soiling. If the above statement is thought worthy of notice, it is humbly submitted to the Honourable Board's approbation, trusting that their candour will forgive the infringement on their time.

I am with due respect their obedient humble servant,

23 April, 1805. T. H.

We the undersigned have examined the subjoined statement, and find it to be correct, as our lands adjoin those of the writer's, where these experiments were tried.

Robert Press, Gent.
David Saunders, Farmer,
James Saunders, Farmer.

North Creak near Burnham,
Norfolk, April 24, 1805.

No. II.

Comparison of the Expenses of Arable Land in 1790 *and* 1804.

In April, 1804, a requisition was sent from the Corn Committee of the House of Commons to the Board of Agriculture, for information relative to the comparative expenses on arable land in the two periods of 1790 and 1803. The Board was solicitous that the information they gave should be the most correct that could be procured: and with this view ordered a circular letter to be sent to a number of their correspondents in every county of the kingdom.

The following Tables are formed from the answers received to that, and to a following letter, which was written with the same view, but requesting the information to be given in the proportions of 100 acres of arable land.

In regard to the information thus procured, it stands upon the distinct authority of the respective individuals, for the accuracy of which it is impossible that any public body can be responsible: but, from comparing the results, there appears to be sufficient reason for concluding that the particulars are given with no inconsiderable degree of care.

RESULT of the Enquiry, being a Recapitulation of the Average Prices of the several Counties, 1790—1803.

LABOUR.

Communication.	Price in Winter, 1790.	Price in Winter, 1804.	Price in Summer, 1790.	Price in Summer, 1804.	Price in Harvest, 1790.	Price in Harvest, 1804.	Head Man's Wages, 1790.	Head Man's Wages, 1804.	Second Man's Wages, 1790.	Second Man's Wages, 1804.
	per week.	per week.	per week.	per week.	per week.	per week.	per ann.	per. ann.	per ann.	per ann.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*£. s. d.*	*£. s. d.*	*£. s. d.*	*£. s. d.*
Bedfordshire -	6 10	9 4	9 0	12 8	11 $9\frac{1}{2}$	15 $3\frac{1}{4}$	9 12 0	13 13 $4\frac{3}{4}$	5 12 0	7 10 $8\frac{1}{4}$
Berkshire - -	7 0	8 8	7 7	9 6	9 6	11 6	8 7 6	10 7 9	5 15 0	7 5 0
Bucks - - -	7 0	10 3	8 3	12 9	15 3	21 6	8 10 0	11 15 0	7 0 0	10 0 0
Cambridgeshire	6 $10\frac{1}{4}$	9 11	8 $10\frac{1}{4}$	12 $8\frac{1}{2}$	16 5	22 11	8 10 0	12 5 0	7 1 5	10 0 0
Cheshire - -	9 0	11 0	9 6	12 0	13 6	13 6	8 6 0	12 6 0	9 0 0	11 0 0
Cornwall - -	6 3	8 $10\frac{1}{2}$	7 0	10 $4\frac{1}{2}$	9 $10\frac{1}{2}$	15 0	7 15 8	11 3 0	5 10 0	8 5 4
Cumberland -	8 4	10 10	9 8	13 0	11 4	16 0	12 6 8	17 3 8	8 11 4	12 6 8
Derbyshire -	6 0	10 3	9 0	18 6	10 6	16 6	6 15 0	11 10 0	5 0 0	8 0 0
Devon - - -	7 0	8 9	8 6	10 6	10 3	12 3	9 1 9	11 2 6	8 1 4	9 16 0
Dorsetshire -	6 0	8 0	6 6	8 6	10 6	14 0	— — —	— — —	— — —	— — —
Durham - -	9 6	12 6	12 0	16 3	15 0	19 6	30 0 0	34 0 0	28 0 0	30 0 0
Essex - - -	7 11	10 $5\frac{1}{4}$	8 $2\frac{1}{2}$	11 4	16 6	24 $6\frac{1}{4}$	9 9 $9\frac{1}{4}$	12 18 $2\frac{3}{4}$	7 18 $6\frac{3}{4}$	10 14 $5\frac{1}{4}$
Gloucestershire	6 $5\frac{1}{4}$	9 6	7 $9\frac{3}{4}$	11 3	10 $7\frac{1}{2}$	15 6	8 2 10	12 6 8	4 15 10	5 7 6
Hants - - -	6 $8\frac{1}{2}$	9 0	7 $1\frac{1}{2}$	10 $1\frac{1}{2}$	12 $1\frac{1}{2}$	16 $9\frac{3}{4}$	7 18 0	11 15 0	4 16 4	7 6 4
Herefordshire -	7 0	9 0	9 0	12 0	— —	12 0	8 0 0	12 0 0	6 0 0	9 0 0
Herts - - -	7 $11\frac{1}{2}$	10 7	9 $8\frac{1}{2}$	12 $6\frac{1}{2}$	16 $4\frac{1}{2}$	22 $1\frac{1}{4}$	9 9 6	11 13 2	7 6 0	9 15 11
Kent - - -	9 7	13 $6\frac{1}{2}$	10 $11\frac{1}{4}$	14 $8\frac{1}{4}$	17 $3\frac{3}{4}$	24 11	11 0 3	14 10 8	8 1 $7\frac{1}{2}$	10 9 $5\frac{1}{2}$
Lancashire -	7 10	13 4	8 9	15 9	7 3	10 0	9 10 0	17 10 0	6 15 4	11 3 8
Leicestershire -	7 0	12 0	7 0	12 0	13 0	18 6	11 0 0	15 0 0	8 0 0	12 0 0
Lincolnshire -	7 $10\frac{1}{4}$	12 0	9 $10\frac{3}{4}$	14 $5\frac{1}{4}$	14 $8\frac{1}{4}$	23 0	12 14 7	19 4 0	8 8 $2\frac{1}{4}$	13 2 $4\frac{3}{4}$
Middlesex -	10 0	12 0	12 0	14 0	15 0	18 0	12 0 0	14 0 0	— — —	— — —
Monmouthshire	6 0	10 0	9 0	12 0	15 0	21 0	12 0 0	15 0 0	9 0 0	12 0 0
Northamptonshire	6 $2\frac{1}{4}$	9 6	7 $9\frac{1}{2}$	10 7	11 $9\frac{1}{2}$	16 $9\frac{1}{2}$	8 6 0	11 10 0	5 14 0	8 0 0
Norfolk - -	7 $2\frac{1}{4}$	10 $0\frac{3}{4}$	8 $8\frac{1}{2}$	12 0	17 $2\frac{3}{4}$	24 4	9 2 0	14 8 0	6 8 0	8 6 0
Northumberland	6 6	9 10	8 4	13 0	10 2	17 6	12 2 0	19 8 0	10 15 0	16 10 0
Notts - - -	7 $8\frac{1}{2}$	12 6	10 $3\frac{1}{4}$	15 $8\frac{1}{4}$	11 8	18 10	10 13 $8\frac{1}{2}$	16 7 5	6 16 10	10 1 6
Oxfordshire -	6 6	8 6	9 0	13 0	13 0	16 6	8 10 0	11 5 0	7 5 0	10 0 0
Rutlandshire -	6 0	12 0	9 0	16 0	21 0	42 0	10 0 0	15 0 0	7 0 0	10 10 0
Salop - - -	6 6	8 3	7 6	10 0	10 6	19 6	8 4 0	11 5 0	4 8 0	6 4 0
Somersetshire -	6 $9\frac{1}{4}$	8 $6\frac{3}{4}$	8 3	10 $8\frac{1}{2}$	11 6	15 $6\frac{3}{4}$	8 5 $8\frac{1}{2}$	11 7 $1\frac{1}{2}$	5 16 4	7 8 4
Staffordshire -	7 0	9 6	8 0	11 0	11 0	16 6	7 13 6	11 11 0	5 2 0	7 13 0
Suffolk - -	6 10	9 $0\frac{1}{2}$	8 4	9 $2\frac{1}{2}$	15 $4\frac{1}{2}$	23 6	8 16 $5\frac{1}{4}$	12 2 $2\frac{1}{4}$	6 0 6	8 11 $1\frac{1}{4}$
Surrey - -	8 6	10 9	10 0	12 3	14 6	18 6	10 1 9	12 12 3	4 6 3	6 6 9
Sussex - - -	8 5	11 0	10 $1\frac{1}{2}$	13 0	12 $6\frac{3}{4}$	20 1	9 2 8	12 5 4	5 4 10	5 8 10
Warwickshire -	8 0	9 0	9 0	12 0	— —	— —	9 9 0	11 11 0	4 4 0	5 5 0
Westmoreland	4 8	8 3	5 11	9 $10\frac{1}{2}$	7 6	16 $7\frac{1}{2}$	17 10 0	31 5 0	13 5 0	23 8 0
Wilts - - -	6 0	7 6	7 6	9 3	9 3	11 0	4 0 0	5 0 0	3 0 0	4 0 0
Worcestershire -	0 10	1 4	1 0	1 6	1 11	2 4	7 0 0	10 10 0	3 0 0	6 0 0
Yorkshire - -	8 $1\frac{1}{2}$	12 $6\frac{1}{2}$	10 $6\frac{3}{4}$	12 $1\frac{1}{2}$	13 $5\frac{1}{4}$	22 5	14 10 6	22 18 4	11 5 10	16 5 6
Wales - - -	5 9	8 0	7 0	9 3	8 $7\frac{1}{4}$	14 $7\frac{1}{2}$	8 11 $2\frac{1}{2}$	12 12 $2\frac{1}{4}$	5 15 $2\frac{1}{4}$	9 0 7
Average -	7 0	9 $10\frac{1}{4}$	8 $6\frac{1}{4}$	11 11	12 $2\frac{3}{4}$	17 $11\frac{1}{2}$	11 15 $2\frac{1}{4}$	16 7 $6\frac{1}{2}$	7 1 $6\frac{1}{4}$	9 16 $11\frac{3}{4}$
Being a rise per cent. of		$36\frac{7}{8}$		$38\frac{3}{8}$		$44\frac{1}{3}$		42		$41\frac{1}{3}$

LABOUR CONTINUED.

Communication.	Reap Wheat, 1790.	Reap Wheat, 1804.	Mow Barley, 1790.	Mow Barley, 1804.	Thresh Wheat, 1790.	Thresh Wheat, 1804.	Thresh Barley, 1790.	Thresh Barley, 1804.	Filling Earth, 1790.	Filling Earth, 1804.	Filling Dung, 1790.	Filling Dung, 1804.
	per acre.	per acre.	per acre.	per acre.	per Qr.	per Qr.	per Qr.	per Qr.	per yard.	per yard.	per load.	per load.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d	s. d.	s d.	s. d.
Bedfordshire -	6 7	11 0	1 8¾	2 8¼	2 2	3 10¾	1 4¼	2 2¾	0 3¾	0 5¼	0 1½	0 2½
Berkshire - -	4 4½	6 7½	1 3	1 10	2 3	3 4	1 1½	1 6	0 1½	0 2	0 1	0 1½
Bucks - - -	7 10½	13 1½	1 7¾	2 7½	2 6½	4 1½	1 5	2 1½	— —	— —	0 4	0 6
Cambridgeshire -	6 4½	11 10¼	2 3	4 0	2 2	4 1½	1 1	1 7	0 2½	0 4½	0 2¼	0 3¾
Cheshire - -	9 0	10 0	— —	— —	2 9	3 2	1 9	2 2	0 1¾	0 2½	0 2	0 2
Cornwall - -	6 2¾	8 8	1 9¾	2 8	3 0	4 4	1 9	2 11	— —	— —	— —	— —
Cumberland -	7 4	11 2	5 10	9 0	1 9½	2 10	1 3¼	1 5½	0 2	0 3½	— —	— —
Derbyshire - -	6 3	11 3	1 5	2 8	3 2	5 3	1 6	2 10½	0 1½	0 2½	0 1¾	0 3¼
Devon - - -	4 10¼	9 6	1 8	2 4½	4 2	6 8	1 7½	2 6½	— —	— —	0 4½	0 6
Dorsetshire - -	5 6	7 0	1 1	1 4	2 2	2 4	1 1	1 4	— —	— —	— —	— —
Durham - -	8 0	10 6	5 0	6 0	4 0	4 6	3 0	3 4	— —	— —	0 3	0 3½
Essex - - -	5 9½	8 11½	1 10½	3 0	2 3	3 7½	1 5	2 0½	0 2½	0 3¼	0 1¾	0 1¾
Gloucestershire -	5 6	7 0¾	1 1½	1 8¾	2 8½	4 0	1 4¼	2 2¼	0 6¾	0 7¼	0 1	0 1½
Hants - - -	6 8½	9 0	1 7	2 3½	2 6¼	3 6	1 1½	1 9	0 2	0 3	0 2	0 2¾
Herefordshire -	3 0	4 6	— —	— —	3 0	4 0	— —	— —	— —	— —	— —	— —
Herts - - -	7 4	12 6¼	2 1	3 1	2 2	3 4½	1 5½	2 2	0 3¼	0 5	0 2½	0 3¾
Kent - - - -	9 3½	14 1½	2 1	3 2¾	2 7	3 10½	1 6	2 0¾	— —	— —	0 3¼	0 3½
Lancashire - -	5 3	9 2	4 6	7 0	2 10	4 4	1 7¼	2 5	0 2½	0 3½	0 3½	0 5½
Leicestershire -	9 0	13 0	2 0	3 6	3 0	6 0	1 8	2 9	— —	— —	— —	— —
Lincolnshire -	6 5¼	11 11¼	1 7	2 8½	2 3½	4 3	1 2¾	2 2¾	0 3	0 4¼	0 2½	0 3¾
Middlesex - -	8 0	12 0	1 8	2 6	4 0	5 4	3 0	4 0	0 2	0 3	0 2½	0 3
Monmouthshire -	4 0	5 6	1 2	1 8	1 10	3 4	1 4	2 3	0 2	0 3½	0 2	0 3
Northamptonshire	7 4¾	11 6	1 9½	2 6	2 3¼	3 7½	1 6¾	2 2¼	0 2¼	0 3¾	0 1¾	0 2½
Norfolk - - -	5 8¾	8 7¼	1 6½	2 4¾	1 11½	3 4½	0 11¾	1 5¾	0 2	0 2¾	0 2	0 3
Northumberland	6 9¾	11 3	6 5¼	12 4	1 11½	3 1	1 6	2 0½	0 6	0 10	0 4½	0 11
Notts - - -	6 11¼	11 9¼	1 6¾	2 8	2 4¼	4 0½	1 4¼	2 4¾	0 2	0 3	0 2	0 3
Oxfordshire - -	7 3	9 9	1 5	2 0	3 2	4 9½	1 4	1 9	0 1¾	0 2½	0 3	0 4
Rutlandshire -	5 0	12 0	1 0	2 0	1 6	4 6	1 0	2 0	— —	— —	- —	— —
Salop - - -	3 6	4 6	0 9	1 0	2 4	3 7	1 4½	2 1½	0 1½	0 2¼	— —	— —
Somersetshire -	5 5	7 6	1 4¾	1 11¼	3 0	4 3	1 5¼	1 11¼	0 2¼	0 3½	0 1¾	0 2¼
Staffordshire -	5 9	8 3	1 2	1 7½	2 6	3 8	1 3	1 8	0 1¾	0 2½	0 2¾	0 3¾
Suffolk - - -	5 4½	6 10	1 3½	2 0¼	2 2	3 5½	1 2	1 9½	0 2½	0 3	0 1½	0 2½
Surrey - - -	8 4	11 10	1 11	3 0	2 8½	4 0	1 5½	2 0	0 2½	0 4	0 2	0 3¼
Sussex - - -	7 8	10 11	1 7½	2 5	4 0½	5 4¼	1 4¼	2 2	0 1½	0 2¼	0 1¼	0 1¾
Warwickshire -	— —	— —	1 2	2 0	3 4	4 0	1 4	2 0	— —	— —	— —	— —
Westmorland -	6 0	12 0	6 9	13 6	1 6	3 0	0 10½	2 6	— —	— —	0 1	0 2
Wilts - - - -	5 9	8 3	1 4	1 9	2 6	4 0	1 4	2 0	— —	— —	— —	— —
Worcestershire -	5 0	7 0	1 3	3 2	2 3	3 4	1 6	2 0	— —	— —	— —	— —
Yorkshire - -	6 5¼	11 11½	4 0¾	6 9	2 5¼	4 2½	1 5½	2 6	0 2	0 3½	0 2	0 3½
Wales - - -	6 8	9 10	1 9¼	2 6	2 3¼	3 1	1 2	1 9½	0 2½	0 3	0 1½	0 2
Average -	6 4	9 9¼	2 1	2 7¼	2 7	3 11¾	1 4¾	2 1¼	0 2½	0 4	0 2¼	0 3½
Being a rise per cent. of	54 1/17		58 4/7		54 3/4		50 5/8		51 1/7		52 7/29	

Communication.	Blacksmith.												Carpenter.				Mason.				Thatcher.				Collar-mak. work.			
	Tire, 1790.		Tire, 1804.		Plough-Irons, 1790.		Plough-Irons, 1804.		Chains, 1790.		Chains, 1804.		Shoeing, 1790.		Shoeing, 1804.		By Day, 1790.		By Day 1804.		By Day, 1790.		By Day, 1804.		By Day, 1790.		By Day, 1804.	
	per lb.		per lb.		per lb.		per lb.		per lb.		per lb.		per lb.		per lb.													
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Bedfordshire -	0	3	0	5 1/2	0	4 3/4	0	6 1/4	0	5	0	5 3/4	0	5	0	6 3/4	1	9	2	5	1	6 1/4	2	3 3/4	1	9 1/2	2	6 1/4	1	5	2	0 1/4
Berkshire - -	0	3 1/4	0	4 1/2	0	3 1/2	0	5 1/2	0	3 1/2	0	5 1/2	0	5	0	7 1/2	2	6 1/2	3	8 1/2	3	6	3	10	2	0	2	4 1/2	2	4	2	4
Buckinghamshire	0	3 1/4	0	4	0	4 1/2	0	5 1/2	0	5 1/2	0	7	0	2 1/2	0	3 1/4	2	3	3	4 1/2	2	5 1/2	3	4 1/2	2	4	3	6	3	0	3	10
Cambridgeshire -	0	3 1/2	0	5 1/4	0	4 1/4	0	5 1/4	0	5	0	6 1/2	0	4 1/2	0	6 1/2	1	9 1/4	2	8	1	11	2	10 3/4	2	0	2	10 3/4	2	0	2	10 3/4
Cheshire - -	0	6	0	6	0	6	0	6	0	9	0	9	0	6 1/2	0	7 3/4	2	1	2	9	2	6	3	0	2	0	2	6	3	0	3	0
Cornwall - -	0	4	0	5 1/2	0	4 3/4	0	6 3/4	0	6 3/4	0	8 3/4	0	5	0	6 3/4	1	3 3/4	2	5	1	6 3/4	2	5	1	9	2	5	—	—	—	—
Cumberland -	0	2 1/2	0	3 3/4	0	4 3/4	0	6 1/4	0	5 1/4	0	7 1/2	0	6	0	8 1/2	1	10 1/2	2	10	1	10 1/2	3	0	1	8 1/2	2	5	2	2 1/2	3	3 1/4
Derbyshire - -	0	3	0	4	0	4 1/2	0	6 3/4	0	4 3/4	0	9	0	4	0	6 1/2	1	11	3	0	1	8	2	9	1	6	2	6	2	0	3	4 1/4
Devonshire - -	0	4	0	4 3/4	0	4 1/4	0	6	0	5	0	6 1/4	0	4 1/2	0	6 1/4	1	6 1/2	2	1 1/4	1	6 1/2	2	1 1/4	1	6 1/2	2	1 1/4	2	6	5	0
Dorsetshire - -	0	3 1/2	0	4 1/2	0	4	0	6	0	5 1/2	0	8 1/2	0	6	0	7	1	6	2	0	1	7	2	2	2	0	2	6	—	—	—	—
Durham - - -	0	3 1/2	0	4 1/2	0	4 1/2	0	6	1	2	1	4	0	6	0	8	2	1	2	7 1/2	2	4	3	1 1/2	2	0	3	0	—	—	—	—
Essex - - -	0	3 1/4	0	4 1/2	0	5 3/4	0	7 3/4	0	5 1/2	0	7	0	4 3/4	0	6 1/2	2	0 3/4	2	9 3/4	2	1	2	9 1/2	2	3 1/2	3	3	1	7	2	7 1/4
Gloucestershire -	0	2 3/4	0	3 1/2	0	4	0	6 1/4	0	5 1/4	0	7	0	4 1/2	0	6 1/4	1	6 3/4	2	4 1/4	1	7 1/4	2	6 1/2	1	7 1/2	2	6	1	9 1/4	2	7 1/2
Hampshire - -	0	3 1/2	0	5 1/4	0	4 3/4	0	6 1/4	0	6	0	10	0	4 3/4	0	7	1	5 1/2	2	9 1/4	1	11 1/4	3	0	1	8 3/4	2	3 1/4	2	0	2	11
Herefordshire -	0	3	0	3 3/4	0	4	0	5	0	4	0	5	0	4	0	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hertfordshire -	0	3	0	4	0	4 3/4	0	6 3/4	0	5 3/4	0	7 3/4	0	6	0	7 3/4	2	3 1/2	3	2 1/4	2	5 3/4	3	5 1/2	2	1 1/2	2	11 1/2	2	1 1/2	3	1 1/4
Kent - - - -	0	2 3/4	0	4 3/4	0	4 1/2	0	6 3/4	0	5 3/4	0	6 3/4	0	5 3/4	0	8 1/4	2	4 1/2	3	6 1/2	2	5 1/2	3	3 1/4	2	5	3	8 1/4	1	9 1/2	2	8 1/2
Lancashire - -	—	—	—	—	0	6 1/2	0	6 1/2	0	6 1/2	0	9	0	5 3/4	0	8 1/2	2	2	3	9	2	2	4	0	1	0	3	2	5	6	7	6
Leicestershire -	—	—	—	—	0	5	0	6	0	6	0	8	0	5	0	6	2	4	3	6	2	0	3	6	2	0	3	0	2	0	2	8
Lincolnshire -	0	3 1/2	0	5 3/4	0	4 1/4	0	6 1/2	0	5	0	7 1/4	0	4 1/2	0	6 1/4	2	2	3	1	2	2 1/2	3	2 1/2	2	1 1/4	3	1	1	9 3/4	2	8 1/2
Middlesex - -	0	4 1/2	0	5 1/2	0	5	0	6 1/2	0	6	0	7	0	6	0	8	2	8	3	6	2	8	4	0	1	8	2	0	2	0	2	3 1/2
Monmouthshire -	0	4	0	5	0	3 1/2	0	4 1/2	0	4	0	5	0	4	0	5	2	0	3	0	2	0	3	0	1	6	2	6	1	8	2	2
Northamptonshire	0	3	0	3 3/4	0	5	0	6 1/2	0	5 1/2	0	7	0	4 3/4	0	6 1/4	1	10	2	6	1	11 1/4	3	0 3/4	1	5 1/2	1	9 1/2	1	10 1/2	2	8 1/2
Norfolk - - -	0	3 1/4	0	4 3/4	0	3 1/2	0	6	0	4 3/4	0	7	0	4 1/2	0	7	1	9 3/4	2	5 3/4	1	11	2	8	2	0	2	11	1	11 1/4	2	8 1/4
Northumberland	0	2 3/4	0	5 1/4	0	3	0	4 1/4	0	4 1/2	0	6 1/2	0	4 1/2	0	7	1	7 1/4	2	9	1	8 1/2	2	6 1/2	1	6 3/4	2	5 1/4	4	0	6	4
Nottinghamshire	0	3 1/4	0	4 1/2	0	4	0	5 3/4	0	5 3/4	0	9 1/2	0	4 1/4	0	6 1/4	2	0	3	0	2	1	3	2 1/2	1	10	2	10	2	0	2	10 1/2
Oxfordshire -	0	3 1/2	0	3 3/4	0	6	0	7	0	6 3/4	0	8 1/2	0	5 1/2	0	6 1/2	1	8	2	5	1	7	2	5	1	7	2	1 1/2	1	10	2	6
Rutlandshire -	0	4	0	4 3/4	0	5	0	6	0	5	0	6	0	5	0	6	1	6	2	6	1	6	2	6	1	6	2	6	2	0	3	0
Shropshire - -	0	2 3/4	0	3 1/4	0	4	0	5 1/2	0	5	0	6 1/2	0	4 1/2	0	6	1	7	2	6	1	7	2	6	1	5	2	1 1/2	—	—	—	—
Somersetshire -	0	4	0	5 1/2	0	4 1/2	0	5 3/4	0	5 1/4	0	7	0	4 3/4	0	6 1/4	1	7 1/2	2	4 1/4	1	6 1/4	2	3 1/2	2	0 1/2	2	11 1/2	1	7	3	2 1/2
Staffordshire -	0	2 1/2	0	3 1/2	0	3 3/4	0	4	0	4 1/2	0	6 3/4	0	4 1/2	0	6	2	0	3	0	2	0	3	0	2	0	3	0	2	6	2	6
Suffolk - - -	0	3 3/4	0	5	0	4 1/2	0	5	0	5 1/4	0	8	0	4 1/2	0	6 1/2	1	10 1/4	2	8 3/4	2	1 1/4	2	11 1/4	2	1 3/4	2	10 3/4	1	9 1/4	2	10
Surrey - - -	0	3 1/2	0	4 3/4	0	4 1/2	0	5 3/4	0	6 1/2	0	9	0	5	0	7 1/4	2	6	3	3	2	6 1/2	3	3 1/2	2	4 1/2	3	0	1	1 1/2	1	5
Sussex - - -	0	3 1/4	0	5	0	4	0	5 1/2	0	6 1/2	0	8 1/2	0	4 1/2	0	6 3/4	2	2 1/4	3	1 1/2	2	3	3	2 1/4	2	1/4	2	11	2	4 1/4	3	0 1/2
Warwickshire -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Westmorland -	0	3 1/2	0	5	0	4	0	5 1/2	0	5 1/2	0	7	1	0 1/2	1	4 1/2	1	10	3	4	2	1	3	4	2	0	4	0	2	6	4	0
Wiltshire - -	0	4	0	4 1/2	0	5	0	6	0	6	0	7 1/2	0	5	0	6	1	8	2	5	1	8	2	5	1	9	2	6	2	0	2	6
Worcestershire -	0	4	0	5	0	4	0	5	0	4	0	5	0	4	0	5	1	6	2	3	1	8	3	0	1	4	2	0	1	6	2	0
Yorkshire - -	0	3 1/4	0	4 3/4	0	4	0	6 1/4	0	5	0	8 1/4	0	4 1/4	0	5 1/2	1	6	3	1	2	1 3/4	3	3 1/4	1	6 1/4	2	7	1	11 1/2	2	5 1/2
Wales - - -	0	2 3/4	0	3 1/4	0	3 3/4	0	5	0	5	0	6 1/2	0	4 1/2	0	6	1	8 1/2	2	8	1	8 1/4	2	4 3/4	1	4 1/4	2	0	2	0	2	10
Average -	0	3 1/4	0	4 1/4	0	4 1/2	0	5 3/4	0	5 1/4	0	7	0	5	0	6 3/4	1	10 3/4	2	9 1/4	2	0	2	9 1/2	1	9 3/4	2	8	2	1	2	11 1/2
Being a rise per cent. of		34 1/2				33 1/15				35 13/15				36 7/19				50 1/4				47 11/17				45 1/18				41 1/2		

RENT, TITHE, AND PARISH TAXES.

Communication.	Rise of Rent, from 1790 to 1804.	Tithe. Per Acre, 1790.	Tithe. Per Acre, 1803.	Parish Taxes. In the Pound, 1790.	Parish Taxes. In the Pound, 1803.
	Per Cent.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Bedfordshire	68¼	0 3 0	0 5 5	0 3 0¾	0 4 6½
Berkshire	22⅙	0 4 0	0 5 10	0 3 1¼	0 8 0¾
Buckinghamshire	27⅞	0 4 3	0 6 6	0 3 9	0 7 0
Cambridgeshire	72¾	0 3 0	0 4 2	0 2 9½	0 4 0
Cheshire	16⅔	0 10 6	0 10 6	0 2 6	0 3 6
Cornwall	60½	0 6 6½	0 8 10	0 3 3	0 5 5½
Cumberland	53	0 3 0	0 4 6	0 1 5¼	0 2 3¼
Derbyshire	61¼	0 1 6	0 3 0	0 5 2	0 10 5
Devonshire	44⅝	0 3 7½	0 4 6	0 3 0	0 5 7½
Dorsetshire	——	— — —	— — —	— — —	— — —
Durham	40	0 7 0	0 9 0	0 5 0	0 7 0
Essex	38⅘	0 3 2¾	0 5 0	0 4 1½	0 10 8¼
Gloucestetshire	48⅕	0 2 9½	0 4 2¼	0 1 5¾	0 3 4¾
Hampshire	54⅒	0 4 4	0 5 11	0 3 1	0 6 5
Herefordshire	20	0 6 0	0 10 0	0 2 6	0 3 3
Hertfordshire	51⅗	0 2 11¼	0 5 0¼	0 3 7½	0 5 4¾
Kent	52½	0 5 0¾	0 8 5¾	0 3 8	0 5 9¼
Lancashire	50	0 9 7	0 13 1	0 2 3	0 4 1
Leicestershire	33	0 1 8	0 2 6	0 1 0	0 2 3
Lincolnshire	43¼	0 3 9	0 5 10½	0 1 7¼	0 3 10½
Middlesex	20	0 3 6	0 4 6	0 4 0	0 4 0
Monmouthshire	33⅓	0 2 6	0 4 0	0 1 6	0 3 0
Northamptonshire	32½	0 5 0	0 7 0	0 3 0¼	0 5 0½
Norfolk	35	0 2 10¼	0 4 6¼	0 3 9	0 4 10¾
Northumberland	69⅛	0 8 5½	0 13 8	0 1 3¾	0 2 7¾
Nottinghamshire	39½	0 2 0	0 3 4	0 1 8	0 3 4
Oxfordshire	20	0 4 6	0 6 0	0 1 7½	0 4 4½
Rutlandshire	50	0 3 0	0 4 6	0 1 9	0 3 6
Shropshire	29	0 2 6	0 3 5	0 1 3	0 1 9¾
Somersetshire	29¼	0 4 6	0 6 7	0 2 9¾	0 7 9
Staffordshire	52¼	0 3 6	0 5 0	0 2 0	0 3 3
Suffolk	30⅜	0 3 6½	0 4 10½	0 3 7	0 6 0¾
Surrey	25⅕	0 4 0	0 6 0	0 2 4	0 4 10½
Sussex	25⅘	0 3 5	0 5 3	0 4 7½	0 8 1¾
Warwickshire	——	— — —	— — —	— — —	— — —
Westmorland	41½	0 9 0	0 11 0	0 2 0	0 5 0
Wiltshire	25	— — —	— — —	0 3 6	0 6 0
Worcestershire	33⅓	— — —	— — —	— — —	— — —
Yorkshire	53⅐	0 4 0½	0 6 0	0 2 1½	0 4 8
Wales	30	0 5 10	0 8 4½	0 2 1¾	0 4 6¾
Average	——	0 4 4¾	0 6 10	0 2 1¼	0 5 0¼
Per cent.	39⅙	48¹¹⁄₁₄		89⅙	

CULTIVATION.

Communication.	Expense of an acre of turnips						Expense of an acre of barley.						Expense of an acre of wheat.						Expense of manure.					
	1790.			1804.			1790.			1804.			1790.			1804.			1790.			1804.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d	£.	s.	d.	£.	s.	d.
Bedfordshire -	3	14	6	5	0	6	2	19	2	4	1	2	4	0	10	5	2	6	0	3	0	0	4	7½
Berkshire - -	2	0	0	2	8	0	2	4	0	2	14	0	2	12	0	3	7	6	0	2	4	0	3	0
Buckinghamshire	4	12	6	6	3	5	2	10	0	3	6	5	5	10	6	7	4	6	0	3	0	0	5	0½
Cambridgeshire -	1	2	4¼	1	11	7	1	0	0	4	2	0	1	3	2½	1	4	1½	0	2	6	0	5	4
Cheshire - -	2	15	0	3	0	0	2	4	0	2	10	0	4	12	6	5	0	0	0	4	0	0	6	0
Cornwall - -	4	9	8	5	18	3	2	6	6	3	8	4	2	18	10	4	8	3	0	1	10	0	3	9
Cumberland -	1	9	0	1	10	4	1	8	2	2	18	0	2	15	8½	4	3	2½	0	1	5½	0	2	10¼
Derbyshire - -	5	7	0	8	3	6	5	3	0	7	18	6	6	0	6	9	17	0	0	4	6	0	7	0
Devonshire - -	2	16	1½	3	9	7½	1	16	0¾	2	6	5¼	4	15	4½	6	2	6	0	2	4	0	2	10¼
Dorsetshire - -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Durham - - -	2	0	0	2	15	0	2	0	0	2	15	0	4	0	0	5	0	0	0	5	0	0	6	4
Essex - - -	2	5	9	3	11	9½	1	1	2	1	6	2	0	19	3*	1	4	0*	0	2	3¼	0	4	3¼
Gloucestershire -	2	10	0	3	7	4	1	16	7½	2	12	4½	2	9	11¼	3	8	6	0	3	9	0	7	1
Hampshire - -	2	12	2	3	16	2	1	19	0	2	14	0	3	2	4	4	5	1	0	2	3	0	3	1
Herefordshire -	4	4	0	5	5	0	—	—	—	—	—	—	5	10	0	7	7	0	0	3	0	0	4	0
Hertfordshire -	3	8	10¾	4	8	10½	2	19	0	4	19	0	4	13	0	5	19	6½	0	3	3¼	0	5	4
Kent - - - -	4	7	1½	6	2	0	3	0	10½	4	1	0	3	9	9¾	4	18	7½	0	3	11¼	0	6	4½
Lancashire - -	5	0	0	7	10	0	3	2	0	4	10	0	3	15	0	5	15	0	0	5	6	0	9	6
Leicestershire -	6	0	0	8	17	0	0	18	0	1	10	0	0	11	0	0	16	0	0	5	0	0	6	8
Lincolnshire -	2	12	3¾	3	19	0½	1	7	1	2	0	1¾	2	14	0½	3	19	8	0	2	3½	0	4	3¾
Middlesex - -	5	9	6	5	16	6	1	15	0	2	0	6	2	2	6	2	2	6	—	—	—	—	—	—
Monmouthshire -	1	11	0	2	1	0	1	14	6	2	3	0	1	4	0	1	6	0	0	5	0	0	5	6
Northamptonshire	3	17	5	4	17	0	3	9	9	4	3	6	5	8	9½	6	10	6	0	3	9½	0	5	3¼
Norfolk - - -	2	13	8½	3	18	1½	1	9	11½	1	18	7	2	3	2¼	2	10	2½	0	2	4¼	0	4	2
Northumberland	3	4	1	4	13	8¼	1	19	9	2	16	6	2	18	1¼	4	5	10	0	3	2½	0	5	4½
Nottinghamshire	4	5	11½	6	0	8	4	4	2½	5	14	10	4	11	1½	6	3	9	0	4	6	0	7	0
Oxfordshire - -	2	6	0	3	2	0	1	2	0	1	8	0	0	14	0	0	18	0	—	—	—	—	—	—
Rutlandshire -	3	2	0	5	2	0	3	10	0	5	7	0	4	0	0	6	2	0	0	5	0	0	10	0
Shropshire - -	2	5	0	3	5	0	1	6	0	1	14	0	1	1	6	1	8	0	0	3	2½	0	4	6
Somersetshire -	3	6	3½	5	0	0	1	18	4½	2	4	4½	3	3	9½	4	17	3½	0	3	8	0	5	9
Staffordshire -	3	11	0	5	6	6	2	0	0	2	15	0	5	3	8	7	2	3	0	3	6	0	4	6
Suffolk - - -	2	16	4½	3	15	7½	2	1	4½	2	14	1¼	3	1	0¾	3	19	4¼	0	1	7¼	0	2	3
Surrey - - -	2	5	10	3	8	0	1	7	10½	1	17	6	2	11	7	4	0	1	0	3	0	0	5	1½
Sussex - - -	5	7	10	7	9	0½	2	8	2½	3	1	7	4	6	9½	6	1	0	0	4	0	0	6	4
Warwickshire -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Westmorland -	—	—	—	8	10	0	2	7	6	4	15	0	2	17	6	5	15	0	0	1	0	0	2	1
Wiltshire - -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	5	0	—	—	—	—	—	—
Worcestershire -	—	—	—	4	10	0	4	10	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Yorkshire - -	4	9	3¼	6	15	10½	2	11	9¼	3	10	5	4	9	0	6	13	5½	0	4	3¼	0	8	3
Wales - - -	3	5	0	4	10	3	1	5	4	1	15	4	4	5	10	5	17	8	0	1	8	0	2	6
Average -	3	6	11	4	12	7	2	2	4¾	2	17	4¾	3	6	6¾	4	11	6½	0	3	2½	0	4	6¼
Being a rise per cent. of				38⅓						39⅝						36⅔						62 2/13		

* This Table is of use merely to shew the *rise per cent.*; but will not at all explain the real expense attending these crops. To take this county of Essex for example, where the expense of an acre of wheat is stated at 19*s.* 3*d.* and £1. 4*s.* There were ten answers from Essex: several of them left these points unanswered; Mr. Pung did not include any expense of teams Mr. Griggs returned an acre of wheat 18*s.* 6*d.* in 1790, and £1. 4*s.* in 1803, evidently, from the sums, omitting many articles. Some correspondents in other counties omitted rent and tithe; some omitted seed; others took no notice of manure; and thus the returns were found so imperfect upon every point except in the difference between the two periods, that the second letter was written to supply the deficiency. The grand point, however, of the rise per cent. remains unimpeached by this circumstance, as the two periods were returned on the same principle by all.

LABOUR.

Rise per Cent.

Communication.	Price in Winter, 1790—1804.	Price in Summer, 1790—1804.	Price in Harvest, 1790—1804.	Head Man's Wages, 1790—1801.	Second Man's Wages, 1790—1804.
Bedfordshire -	60	$40\frac{5}{9}$	$29\frac{143}{383}$	$37\frac{1}{15}$	$34\frac{1}{2}$
Berkshire - -	$23\frac{17}{24}$	$25\frac{25}{91}$	$21\frac{3}{57}$	$24\frac{2}{67}$	$26\frac{2}{13}$
Buckinghamshire	$46\frac{3}{7}$	$54\frac{6}{11}$	41	$38\frac{4}{17}$	$42\frac{6}{17}$
Cambridgeshire -	$44\frac{32}{47}$	$43\frac{45}{85}$	$39\frac{117}{197}$	$44\frac{10}{85}$	$41\frac{7}{15}$
Cheshire - -	$22\frac{2}{9}$	$26\frac{18}{57}$	——	$48\frac{10}{83}$	$29\frac{2}{9}$
Cornwall - -	42	$48\frac{3}{14}$	52	$41\frac{87}{118}$	$50\frac{1}{3}$
Cumberland -	30	$34\frac{14}{29}$	$41\frac{3}{17}$	$39\frac{7}{37}$	$43\frac{24}{25}$
Derbyshire - -	$70\frac{5}{6}$	$105\frac{5}{9}$	$57\frac{1}{7}$	$70\frac{10}{27}$	60
Devonshire - -	25	$23\frac{27}{52}$	$19\frac{63}{123}$	$22\frac{3}{7}$	$21\frac{1}{2}$
Dorsetshire - -	$33\frac{1}{3}$	$30\frac{10}{13}$	$33\frac{1}{3}$	——	——
Durham - - -	$31\frac{33}{47}$	$35\frac{5}{12}$	30	$13\frac{1}{3}$	$7\frac{1}{7}$
Essex - - -	$42\frac{7}{19}$	$38\frac{14}{197}$	$48\frac{19}{22}$	$36\frac{1}{2}$	$35\frac{1}{2}$
Gloucestershire -	$47\frac{16}{38}$	44	$45\frac{45}{91}$	$51\frac{1}{2}$	$12\frac{1}{13}$
Hampshire - -	$34\frac{1}{6}$	$42\frac{2}{19}$	$38\frac{64}{97}$	$48\frac{58}{79}$	52
Herefordshire -	$28\frac{4}{7}$	$33\frac{1}{3}$	——	50	50
Hertfordshire -	33	$29\frac{4}{13}$	35	$23\frac{1}{21}$	$34\frac{8}{43}$
Kent - - - -	$47\frac{7}{23}$	$34\frac{5}{19}$	44	32	30
Lancashire - -	$70\frac{10}{47}$	$70\frac{10}{21}$	38	$84\frac{4}{19}$	$65\frac{55}{203}$
Leicestershire -	$71\frac{3}{7}$	$71\frac{3}{7}$	$42\frac{4}{13}$	$36\frac{4}{11}$	50
Lincolnshire -	53	46	56	51	56
Middlesex - -	20	$16\frac{2}{3}$	20	$16\frac{2}{3}$	——
Monmouthshire -	$66\frac{2}{3}$	$33\frac{1}{3}$	40	25	$33\frac{1}{3}$
Norfolk - - -	$43\frac{33}{69}\frac{3}{5}$	$38\frac{54}{417}$	$41\frac{1}{4}$	$58\frac{22}{90}$	$29\frac{1}{16}$
Northamptonshire	$53\frac{3}{79}$	36	$42\frac{1}{2}$	$38\frac{46}{33}$	$41\frac{20}{50}$
Northumberland -	$51\frac{11}{59}$	56	$71\frac{8}{61}$	$60\frac{1}{3}$	$53\frac{21}{43}$
Nottinghamshire	$62\frac{6}{17}$	53	$61\frac{1}{7}$	$53\frac{1}{8}$	$41\frac{1}{6}$
Oxfordshire - -	$30\frac{10}{13}$	$44\frac{4}{9}$	$26\frac{12}{13}$	$32\frac{6}{17}$	38
Rutlandshire -	100	$77\frac{7}{9}$	100	50	50
Shropshire - -	27	$33\frac{1}{3}$	$85\frac{15}{21}$	$37\frac{3}{41}$	$40\frac{10}{11}$
Somersetshire -	$26\frac{6}{13}$	30	$35\frac{13}{46}$	$37\frac{1}{2}$	$27\frac{1}{2}$
Staffordshire -	$35\frac{5}{7}$	$37\frac{1}{2}$	50	$50\frac{1}{2}$	50
Suffolk - - -	$32\frac{21}{82}$	$11\frac{1}{2}$	$52\frac{13}{18}\frac{1}{3}$	38	42
Surrey - - -	$26\frac{8}{17}$	$22\frac{1}{2}$	$27\frac{51}{87}$	$25\frac{1}{34}$	47
Sussex - - -	$30\frac{70}{101}$	$28\frac{31}{81}$	60	$34\frac{1}{3}$	4
Warwickshire -	$12\frac{1}{2}$	$33\frac{1}{3}$	——	$22\frac{2}{9}$	25
Westmorland -	$76\frac{11}{12}$	67	$19\frac{8}{9}$	77	$77\frac{32}{53}$
Wiltshire - -	25	$22\frac{2}{9}$	19	$25\frac{1}{2}$	$33\frac{13}{27}$
Worcestershire	60	50	$21\frac{17}{23}$	50	100
Yorkshire - -	$54\frac{14}{19}$	$14\frac{1346}{1069}$	$66\frac{106}{129}$	58	$44\frac{36}{275}$
Wales - - -	$39\frac{3}{33}$	$32\frac{1}{7}$	70	$47\frac{1}{3}$	57
Average rise per cent.	$36\frac{7}{8}$	$38\frac{3}{8}$	$44\frac{1}{3}$	42	$41\frac{1}{3}$

LABOUR CONTINUED.

Rise per Cent.

Communication.	Reap Wheat, 1790—1804.	Mow Barley, 1790—1804.	Thresh Wheat, 1790—1804.	Thresh Barley, 1790—1804.	Filling Earth, 1790—1804.	Filling Dung, 1790—1804.
Bedfordshire -	68	$55\frac{35}{83}$	$79\frac{21}{20}$	$64\frac{8}{13}$	40	$66\frac{2}{3}$
Berkshire - -	$51\frac{3}{7}$	$46\frac{2}{3}$	$48\frac{4}{27}$	$33\frac{1}{2}$	$33\frac{1}{3}$	50
Buckinghamshire	$66\frac{2}{3}$	$59\frac{39}{70}$	$62\frac{18}{61}$	50	——	50
Cambridgeshire -	86	$77\frac{7}{9}$	$90\frac{5}{13}$	$46\frac{2}{13}$	80	$66\frac{2}{3}$
Cheshire - -	$11\frac{1}{9}$	——	$15\frac{5}{23}$	$23\frac{17}{21}$	$42\frac{6}{7}$	——
Cornwall - -	$39\frac{3}{29}$	$47\frac{14}{87}$	$33\frac{1}{3}$	$66\frac{2}{3}$	——	——
Cumberland - -	$52\frac{3}{11}$	$54\frac{2}{7}$	$58\frac{6}{43}$	$14\frac{26}{41}$	75	——
Derbyshire - -	80	$88\frac{4}{7}$	$65\frac{15}{19}$	$91\frac{2}{3}$	$66\frac{2}{3}$	$85\frac{5}{7}$
Devon - - -	95	$42\frac{1}{2}$	60	$58\frac{34}{77}$	——	$33\frac{1}{3}$
Dorsetshire - -	$27\frac{3}{11}$	$23\frac{1}{13}$	$7\frac{9}{13}$	$23\frac{1}{13}$	——	——
Durham - -	$31\frac{1}{4}$	20	$12\frac{1}{2}$	$11\frac{1}{9}$	——	$16\frac{2}{3}$
Essex - - -	$54\frac{9}{13}$	$61\frac{71}{89}$	$61\frac{1}{9}$	$44\frac{1}{8}$	30	60
Gloucestershire -	$28\frac{27}{67}$	$53\frac{19}{27}$	$47\frac{9}{13}$	$61\frac{35}{65}$	$7\frac{11}{20}$	50
Hampshire - -	$34\frac{1}{6}$	$44\frac{14}{19}$	$38\frac{92}{121}$	$55\frac{5}{9}$	50	$37\frac{1}{2}$
Herefordshire -	50	——	$33\frac{1}{3}$	——	——	——
Hertfordshire -	$70\frac{65}{84}$	48	$46\frac{2}{13}$	$48\frac{4}{7}$	$53\frac{12}{13}$	$66\frac{2}{3}$
Kent - - - - -	52	55	50	$37\frac{1}{2}$	——	$7\frac{9}{13}$
Lancashire - -	$74\frac{38}{63}$	$55\frac{5}{9}$	53	$50\frac{50}{77}$	30	$57\frac{1}{7}$
Leicestershire -	$44\frac{4}{9}$	75	100	65	——	——
Lincolnshire -	$85\frac{1}{2}$	$71\frac{1}{19}$	$85\frac{5}{11}$	$81\frac{21}{50}$	$41\frac{2}{3}$	50
Middlesex - -	50	50	$33\frac{1}{2}$	$33\frac{1}{3}$	50	20
Monmouthshire -	$16\frac{2}{3}$	$42\frac{6}{7}$	$81\frac{9}{14}$	$81\frac{9}{11}$	75	50
Norfolk - - -	$50\frac{2}{14}$	$50\frac{11}{17}$	$72\frac{14}{47}$	$51\frac{3}{47}$	$37\frac{1}{2}$	50
Northamptonshire	$55\frac{35}{71}$	$39\frac{23}{43}$	$59\frac{60}{109}$	40	$36\frac{4}{16}$	$42\frac{6}{7}$
Northumberland -	$65\frac{15}{109}$	$91\frac{27}{103}$	$57\frac{21}{47}$	$36\frac{1}{9}$	$66\frac{2}{3}$	120
Nottinghamshire	70	$70\frac{2}{3}$	$71\frac{77}{113}$	$76\frac{12}{13}$	50	50
Oxfordshire - -	$44\frac{42}{87}$	$41\frac{3}{17}$	$51\frac{6}{19}$	$31\frac{1}{4}$	$42\frac{6}{7}$	$33\frac{1}{3}$
Rutlandshire -	140	100	200	100	——	——
Shropshire - -	$28\frac{4}{7}$	$33\frac{1}{1}$	$53\frac{2}{3}$	$54\frac{6}{11}$	50	——
Somersetshire -	$38\frac{6}{13}$	$38\frac{54}{67}$	$41\frac{2}{3}$	$34\frac{54}{63}$	40	$28\frac{4}{7}$
Staffordshire -	$43\frac{11}{23}$	$39\frac{26}{39}$	$46\frac{2}{3}$	$33\frac{1}{3}$	$42\frac{6}{7}$	$36\frac{10}{11}$
Suffolk - - -	$27\frac{22}{129}$	$56\frac{14}{31}$	$59\frac{8}{13}$	$53\frac{4}{7}$	$48\frac{44}{97}$	50
Surrey - - -	42	$56\frac{12}{23}$	$47\frac{9}{13}$	$37\frac{1}{7}$	60	$87\frac{1}{2}$
Sussex - - -	$42\frac{9}{27}$	$48\frac{28}{39}$	$27\frac{36}{97}$	60	$66\frac{2}{3}$	40
Warwickshire -	——	$71\frac{3}{7}$	20	$71\frac{3}{7}$	——	——
Westmorland -	100	100	——	$133\frac{2}{21}$	——	100
Wiltshire - -	$43\frac{11}{23}$	31	60	50	——	——
Worcestershire -	40	60	$48\frac{4}{27}$	$33\frac{1}{3}$	——	——
Yorkshire - -	$70\frac{70}{309}$	$66\frac{2}{13}$	$72\frac{76}{117}$	$71\frac{3}{7}$	75	75
Wales - - -	$47\frac{1}{2}$	$41\frac{3}{17}$	$35\frac{85}{109}$	$51\frac{22}{23}$	20	$33\frac{1}{3}$
Average rise per cent	$54\frac{1}{17}$	$58\frac{4}{5}$	$54\frac{3}{4}$	$50\frac{5}{8}$	$51\frac{1}{7}$	$52\frac{7}{29}$

ARTISANS.

Rise per Cent.

Communication.	Blacksmith.				Carpenter.	Mason.	Thatcher.	Collar-maker.
	Tire, 1790—1804.	Plough-Irons, 1790—1804.	Chains, 1790—1804.	Shoeing, 1790—1804.	1790—1804.	1790—1804.	1790—1804.	1790—1804.
Bedfordshire	83 1/3	47 1/17	15	35	38 1/11	52 4/7 3	40 6/8 3	42 1/17
Berkshire	38 6/13	57 1/7	57 1/7	50	45 5/6 1	9 1/2 1	18 3/4 9	45 1/11
Buckinghamshire	23 7/13	29 7/17	27 3/11	30	50	37 1/5 9	50	27 7/9
Cambridgeshire	50	23 9/17	30	44 4/9	50 10/17	48 1/2 3	45 5/6	45 5/6
Cheshire	—	—	—	19 3/7 3	32	20	25	—
Cornwall	37 1/2	42 2/19	29 1/2 7	35	84 8/13	54 2/3	39 1/2 1	—
Cumberland	30	31 1/19	42 1/2 1	41 2/3	51 1/9	60	41 1/4 1	49 3/5 3
Derbyshire	33 1/3	58 1/17	89 9/19	60 1/2	56 1/2 3	65	66 2/3	69 1/2 4
Devon	18 3/4	41 3/17	30	38 8/9	36 1/3 7	36 1/2	36 1/2	100
Dorsetshire	28 4/7	50	54 6/11	16 2/3	33 1/3	36 1/6 1 9	25	—
Durham	28 4/7	33 1/3	14 2/7	33 1/3	26	26 1/14	50	—
Essex	38 6/13	34 1/2 3	27 3/11	36 1/6 1 9	36 4/11	34	41 1/2 1	62 2/7 7
Gloucestershire	27 3/11	56 1/4	33 1/3	38 8/9	50 2/3	58 3/4 7 7	53 1/13	48 4/17
Hampshire	33 1/3	31 1/19	66 2/3	47 7/19	90	54 2/6 3 4	31 1/3	45 5/6
Herefordshire	25	25	25	25	—	—	—	—
Hertfordshire	33 1/3	42 2/9	34 1/2 3	29 1/6	39 1/11	39 1/2	39 1/6 1	46 4/11
Kent	72 8/11	50	17 9/2 3	43 1/2 3	49 7/17	33 3/5 9	52 1/2 9	51 7/43
Lancashire	—	—	38 6/13	47 1/2 3	73 1/13	84 1/13	72 8/11	36 4/11
Leicestershire	—	20	33 1/3	20	50	75	50	33 1/3
Lincolnshire	64 2/7	52 1/6 1 7	45	38 8/9	42 4/13	45 1/5 3	46 1/2	49 3/8 7
Middlesex	22 2/9	30	16 2/3	33 1/3	31 1/4	25	20	12 1/2
Monmouthshire	25	28 4/7	25	25	50	50	66 2/3	30
Norfolk	35 5/7	71 2/4	47 7/9	64 1/2 1 7	36 6/8 7	39 3/2 3	45 5/6 9	38 5/9 3
Northamptonshire	25	30	27 3/11	31 1/19	36 4/11	57	24 2/7	44 4/9
Northumberland	90 1/11 0	41 2/3	44 2/9	55 5/9	71 3/7	48 3/4 2 1	56	58 1/3
Nottinghamshire	38 6/13	43 3/4	72 8/11	47 1/17	50	54	54 6/11	43 3/4
Oxfordshire	—	—	26	18 2/11	45	52 1/2 1 9	34 4/19	36 4/66
Rutlandshire	20	20	20	20	66 2/3	66 2/3	66 2/3	50
Shropshire	18 2/11	37 1/2	30	33 1/4	57 1/19	57 1/19	50	—
Somersetshire	37 1/2	27 7/9	33 1/3	36 1/6 1 9	45	49 1/3	45	102 4/7 6
Staffordshire	40 5/7	6 2/3	50	33 1/3	50	50	50	—
Suffolk	33 1/3	11 1/9	52 8/2 4	44 4/9	47 1/8 9	39 6/10	34 1/10 3	60
Surrey	26 2/3	27 7/9	38 5/8 1 7	45	30	29 1/2	26 1/5 7	26
Sussex	33 1/2	37 1/2	30 1/13 0	50	42 6/7	41 2/3	38 6/10 2 1	29 2/11 2 3
Warwickshire	—	—	—	—	—	—	—	—
Westmorland	42 6/7	39 3/8	27 3/11	32	71 1/11 9	60	100	60
Wiltshire	12 1/2	20	25	20	45	45	4 6/7	25
Worcestershire	25	25	25	25	50	80	50	33 1/3
Yorkshire	46 2/3	56 1/4	65	29 7/17	105 5/9	57 4/10 3 1	70	25 5/9 0 4
Wales	36	33 1/3	30	33 1/3	45 5/11	38 4/8 6 3	47 1/13 0	20 2/3
Average rise per cent	34 1/2	33 1/15 1	35 1/15 3	36 7/39	50 1/5	47 1/17 1	45 1/33 1	41 1/2

Average of per Centages.

RENT, TITHE, AND PARISH TAXES.

Communication.	Rise of Rent, from 1790 to 1804.	Tithe. 1790—1804.	Parish Taxes. 1790—1804.
Bedfordshire - -	$68\frac{1}{4}$	$80\frac{5}{9}$	$48\frac{44}{147}$
Berkshire - - -	$22\frac{1}{6}$	$45\frac{5}{6}$	158
Buckinghamshire -	$27\frac{7}{9}$	$54\frac{49}{51}$	$86\frac{2}{3}$
Cambridgeshire -	$72\frac{3}{4}$	$38\frac{8}{9}$	$35\frac{55}{67}$
Cheshire - - -	$16\frac{2}{3}$	——	40
Cornwall - - -	$60\frac{1}{2}$	$35\frac{3}{157}$	$67\frac{37}{39}$
Cumberland - -	53	50	58
Derbyshire - - -	$61\frac{1}{4}$	100	$101\frac{19}{31}$
Devonshire - - -	$44\frac{5}{9}$	$24\frac{12}{87}$	$18\frac{4}{73}$
Dorsetshire - - -	——	——	——
Durham - - - - -	40	$28\frac{4}{7}$	40
Essex - - - - -	$38\frac{8}{9}$	$54\frac{26}{31}$	$165\frac{15}{19}$
Gloucestershire -	$48\frac{12}{35}$	50	$129\frac{44}{71}$
Hampshire - - -	$34\frac{7}{108}$	$36\frac{7}{13}$	$108\frac{4}{37}$
Herefordshire - -	20	$66\frac{2}{3}$	30
Hertfordshire - -	$51\frac{7}{36}$	$70\frac{131}{141}$	$48\frac{74}{87}$
Kent - - - - - -	$52\frac{5}{12}$	$67\frac{1}{2}$	$57\frac{17}{44}$
Lancashire - - -	50	$36\frac{12}{23}$	$81\frac{1}{2}$
Leicestershire - -	33	50	125
Lincolnshire - - -	$43\frac{1}{4}$	$56\frac{2}{3}$	$141\frac{43}{77}$
Middlesex - - -	20	$28\frac{4}{7}$	——
Monmouthshire - -	$33\frac{1}{3}$	60	100
Norfolk - - - - -	35	$58\frac{5}{13}$	$30\frac{5}{9}$
Northamptonshire -	$32\frac{1}{2}$	40	$66\frac{26}{29}$
Northumberland -	$69\frac{13}{18}$	$61\frac{11}{20}$	$101\frac{37}{63}$
Nottinghamshire -	$39\frac{7}{12}$	$66\frac{2}{3}$	100
Oxfordshire - - -	20	$33\frac{1}{3}$	$169\frac{3}{13}$
Rutlandshire - -	50	50	100
Shropshire - - -	29	$36\frac{2}{3}$	45
Somersetshire - -	$29\frac{10}{21}$	$46\frac{8}{27}$	$175\frac{1}{2}$
Staffordshire - -	$52\frac{1}{4}$	$42\frac{6}{7}$	75
Suffolk - - - - -	$30\frac{31}{51}$	$37\frac{11}{17}$	$68\frac{1}{13}$
Surrey - - - - -	$25\frac{15}{19}$	50	$108\frac{1}{28}$
Sussex - - - - -	$25\frac{4}{15}$	$53\frac{27}{41}$	$76\frac{1}{110}$
Warwickshire - -	——	——	——
Westmorland - -	$41\frac{1}{2}$	$22\frac{9}{11}$	$158\frac{1}{3}$
Wiltshire - - - -	25	——	$71\frac{3}{7}$
Worcestershire - -	$33\frac{1}{3}$	$33\frac{1}{3}$	100
Yorkshire - - -	$53\frac{7}{27}$	$43\frac{20}{37}$	$119\frac{31}{51}$
Wales - - - - -	30	$44\frac{4}{7}$	$112\frac{4}{7}$
Average rise per cent.	$39\frac{6}{7}$	$48\frac{11}{14}$	$89\frac{6}{7}$

CULTIVATION.

Communication.	Expense of an acre of turnips. 1790—1804.	Expense of an acre of barley. 1790—1804.	Expense of an acre of wheat. 1790—1804.	Expense of manure. 1790—1804.
Bedfordshire -	35	$37\frac{13}{71}$	$26\frac{78}{97}$	$54\frac{1}{5}$
Berkshire - -	45	$22\frac{8}{11}$	$29\frac{21}{26}$	$28\frac{4}{7}$
Buckinghamshire	$33\frac{47}{111}$	$32\frac{5}{6}$	$30\frac{170}{210}$	$68\frac{1}{18}$
Cambridgeshire -	$41\frac{307}{1073}$	$91\frac{11}{61}$	4	$113\frac{1}{3}$
Cheshire - -	$9\frac{1}{11}$	$13\frac{7}{11}$	$35\frac{20}{23}$	50
Cornwall - -	32	47	50	$104\frac{6}{11}$
Cumberland - -	$4\frac{52}{87}$	106	$41\frac{1}{2}$	$104\frac{8}{23}$
Derbyshire - -	$52\frac{86}{107}$	54	$63\frac{35}{72}\frac{1}{4}$	$55\frac{5}{9}$
Devon - - -	$24\frac{24}{449}$	29	$28\frac{1}{2}$	$20\frac{1}{2}$
Dorsetshire - -	——	——	——	——
Durham - -	$37\frac{1}{2}$	$37\frac{1}{2}$	25	25
Essex - - -	57	$23\frac{79}{127}$	$24\frac{52}{77}$	$88\frac{8}{109}$
Gloucestershire -	$34\frac{2}{3}$	$43\frac{1}{293}$	$37\frac{1}{7}$	$88\frac{8}{9}$
Hampshire - -	46	$38\frac{6}{13}$	$36\frac{1}{2}$	$37\frac{1}{27}$
Herefordshire -	25	——	$33\frac{7}{11}$	$33\frac{1}{3}$
Hertfordshire -	29	$67\frac{47}{59}$	$28\frac{1}{2}$	$63\frac{9}{157}$
Kent - - - - -	$40\frac{1}{32}$	$33\frac{1}{16}$	$41\frac{1}{4}$	62
Lancashire - -	50	$41\frac{5}{91}$	$53\frac{1}{3}$	$72\frac{8}{11}$
Leicestershire -	$47\frac{1}{2}$	$66\frac{2}{3}$	$45\frac{5}{11}$	25
Lincolnshire -	$51\frac{1}{10}$	$48\frac{3}{4}$	$47\frac{1}{2}$	$88\frac{2}{11}$
Middlesex - -	$6\frac{1}{2}$	$15\frac{5}{7}$	——	——
Monmouthshire -	$32\frac{9}{31}$	$24\frac{44}{669}$	$8\frac{1}{3}$	10
Norfolk - - -	$45\frac{5}{12}$	$28\frac{5}{7}$	$16\frac{1}{4}$	$76\frac{112}{113}$
Northamptonshire	$25\frac{1}{3}$	$19\frac{19}{27}$	20	$40\frac{1}{9}$
Northumberland -	$46\frac{15}{31}$	$42\frac{22}{159}$	48	$67\frac{4}{7}$
Nottinghamshire	$40\frac{1}{2}$	$36\frac{1}{3}$	$35\frac{1}{2}$	$55\frac{5}{9}$
Oxfordshire - -	$34\frac{18}{23}$	$27\frac{3}{11}$	$28\frac{4}{7}$	——
Rutlandshire -	$64\frac{16}{30}$	$52\frac{6}{7}$	$52\frac{1}{2}$	100
Shropshire - -	$44\frac{4}{9}$	$30\frac{10}{14}$	$30\frac{1}{4}$	$41\frac{6}{51}$
Somersetshire -	51	16	46	$56\frac{7}{11}$
Staffordshire -	50	$37\frac{1}{2}$	$37\frac{6}{31}$	$28\frac{6}{13}$
Suffolk - - -	$36\frac{1}{4}$	31	40	$38\frac{1}{7}$
Surrey - - -	$48\frac{4}{14}$	$34\frac{118}{223}$	$55\frac{1}{5}$	$70\frac{5}{6}$
Sussex - - -	$30\frac{1}{4}$	$27\frac{1}{2}$	$20\frac{1}{4}$	$58\frac{1}{3}$
Warwickshire -	——	——	——	——
Westmorland -	——	100	100	$144\frac{8}{19}$
Wiltshire - -	——	——	——	——
Worcestershire -	——	——	——	——
Yorkshire - -	52	$36\frac{1}{62}$	50	$93\frac{9}{41}$
Wales - - -	$38\frac{11}{13}$	$39\frac{18}{19}$	$37\frac{9}{103}$	50
Average rise per cent	$38\frac{1}{3}$	$39\frac{5}{7}$	$36\frac{2}{7}$	$62\frac{2}{13}$

LABOUR.

	Per cent.	Average per cent.
Rise in the price in winter, from anno 1790 to 1803 -	$36\frac{7}{8}$	
——— in summer - - -	$38\frac{2}{3}$	$37\frac{5}{8}$
——— in harvest - - -	$44\frac{1}{3}$	
——— reaping wheat - - -	$54\frac{1}{17}$	
——— mowing barley - - -	$58\frac{4}{7}$	$52\frac{1}{4}$
——— head man's wages - -	42	
——— second man's ditto - - -	$41\frac{1}{3}$	$41\frac{2}{3}$
——— threshing wheat - - -	$54\frac{3}{4}$	
——— barley - - -	$50\frac{5}{8}$	$52\frac{9}{116}$
——— Filling earth - - -	$51\frac{1}{9}$	
——— Ditto dung - - -	$52\frac{7}{29}$	$51\frac{3}{4}$
	Average	47

ARTISANS.

Blacksmith—Rise in the price of tire, from 1790 to 1803	$34\frac{1}{2}$	
——— ——— ——— ——— plough-irons - -	$33\frac{11}{115}$	
——— ——— ——— ——— chains - -	$35\frac{13}{115}$	
——— ——— ——— ——— shoes - -	$36\frac{7}{39}$	$35\frac{3}{4}$
Carpenter ——— ——— - - -	$50\frac{1}{3}$	
Mason ——— ——— - - -	$47\frac{11}{17}$	
Thatcher ——— ——— - - -	$45\frac{1}{38}$	
Collar-maker ——— ——— - - -	$41\frac{1}{2}$	$46\frac{1}{4}$
	Average	41

RENT, TITHE, AND TAXES.

	Per cent.	Average per cent.
Rise of rent, from 1790 to 1803 - - -	$39\frac{6}{7}$	
——— tithe - - - - -	$48\frac{1}{4}$	
——— rates - - - - -	$89\frac{6}{7}$	
	Average	$59\frac{1}{3}$

CULTIVATION OF ARABLE LAND.

Average rise on an acre of turnips, from 1790 to 1803 -	$38\frac{1}{3}$	
——— barley - - -	$39\frac{5}{7}$	
——— wheat - - -	$36\frac{2}{7}$	
		38
Average rise by the tables for 100 acres	$36\frac{1}{2}$	36½

MANURES.

Average rise of manure, from 1790 to 1803 - - - $62\frac{2}{7}$

Communication.	Rent.						Tithe.						Rates and Taxes.					
	1790.			1803.			1790.			1803.			1790.			1803.		
	£.	s.	d.	£.	s.	d	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d
Bedfordshire -	80	0	0	100	0	0	17	10	0	28	15	0	12	3	9	22	11	6
Buckinghamshire	—	—	–	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cheshire - -	125	0	0	150	0	0	12	0	0	15	0	0	24	0	0	30	0	0
Cornwall - -	75	0	0	100	0	0	30	0	0	40	0	0	7	10	0	10	0	0
Devonshire - -	110	0	0	150	0	0	12	7	6	22	10	0	15	0	0	26	5	0
Durham - - -	138	0	0	200	0	0	13	5	0	16	6	0	11	5	0	29	5	0
Essex - - -	87	10	0	107	10	0	19	0	0	22	10	0	21	5	0	41	6	3
Gloucestershire -	82	10	0	110	0	0	—	—	—	—	—	—	13	10	0	28	0	0
Hampshire - -	86	6	8	108	6	8	24	3	4	31	19	4	21	0	6	37	19	0
Herefordshire - -	60	0	0	75	0	0	9	0	0	12	0	0	20	0	0	24	0	0
Hertfordshire - -	50	0	0	75	0	0	12	10	0	20	0	0	8	0	0	18	12	6
Kent - - - -	88	0	0	138	0	0	38	1	2	50	8	10½	18	18	0	31	16	0
Lancashire - -	162	10	0	229	0	0	59	19	2	70	9	2	25	6	3	59	19	0
Lincolnshire - -	81	5	4	111	3	4	17	1	3	22	5	0	15	16	0	28	11	11½
Norfolk - - -	80	0	0	108	16	8	15	19	6	21	7	10	17	13	5¾	34	12	2¼
Northamptonshire	75	0	0	105	0	0	18	0	0	18	0	0	44	0	0	60	0	0
Nottinghamshire	90	0	0	110	0	0	26	10	0	31	0	0	40	0	0	65	0	0
Northumberland	125	0	0	175	0	0	25	10	0	25	10	0	10	4	0	17	7	8
Rutlandshire -	35	0	0	50	0	0	10	0	0	10	0	0	4	15	0	15	0	0
Shropshire - -	70	0	0	105	0	0	7	0	0	15	0	0	7	0	0	15	0	0
Somersetshire -	118	10	0	160	13	1½	21	1	10½	31	13	9	18	1	6	30	9	0
Suffolk - - -	68	5	0	94	15	10	17	18	4	25	0	0	14	11	7½	30	3	9
Surry - - - -	80	0	0	90	0	0	21	0	0	37	0	0	22	0	0	38	0	0
Staffordshire - -	—	—	–	—	—	—	—	—	—	—	—	—	27	10	0	40	0	0
Wiltshire - - -	100	0	0	125	0	0	20	0	0	18	10	0	17	10	0	30	0	0
Yorkshire - - -	65	0	0	152	10	0	20	0	0	—	—	—	16	0	0	35	0	0
Wales - - -	75	0	0	97	10	0	15	0	0	22	0	0	7	0	0	17	0	0
Average -	88	6	0¾	121	2	7¼	20	14	1¾	26	8	0¼	17	13	10	31	7	7¾

Communication.	Wear and Tear.						Labour.					
	1790.			1803.			1790.			1803.		
	£.	s.	d.	£.	s.	d.	£.	s.	d	£.	s.	d.
Bedfordshire -	10	0	0	14	10	0	88	10	0	130	0	0
Buckinghamshire	—	—	–	—	—	—	—	—	—	—	—	–
Cheshire - -	7	0	0	10	0	0	102	4	0	127	14	0
Cornwall - -	2	10	0	3	6	8	25	0	0	37	10	0
Devonshire - -	15	0	0	25	0	0	52	0	0	82	0	0
Durham - - -	4	15	0	6	0	0	53	0	0	68	5	0
Essex - - -	21	0	0	28	0	0	103	3	6	130	0	4½
Gloucestershire -	12	10	0	17	0	0	70	0	0	94	0	0
Hampshire - -	18	6	8	27	13	4	88	6	8	128	6	8
Herefordshire - -	24	0	0	25	0	0	90	0	0	110	0	0
Hertfordshire - -	12	7	0	16	10	6	89	13	8	140	17	5
Kent - - - -	23	10	0	33	2	0	147	0	9	191	18	1½
Lancashire - -	33	15	0	55	0	0	110	4	0	168	6	0
Lincolnshire - -	13	0	6¼	19	18	8	81	4	0	121	2	4½
Norfolk - - -	18	0	10	24	5	0	94	18	10	126	0	4
Northamptonshire	18	0	0	28	0	0	83	0	0	110	0	0
Nottinghamshire	12	2	6½	18	2	3	81	10	0	122	0	0
Northumberland	22	16	6	24	18	4	38	10	0	46	8	0
Rutlandshire -	15	0	0	22	10	0	70	0	0	110	0	0
Shropshire - -	5	0	0	7	10	0	60	0	0	100	0	0
Somersetshire -	10	17	4½	16	9	11¾	108	4	11½	131	16	5½
Suffolk - - -	15	10	0	24	0	0	93	0	0	132	9	4
Surry - - - -	46	0	0	70	0	0	210	0	0	285	0	0
Staffordshire - -	13	10	0	18	0	0	80	0	0	105	0	0
Wiltshire - - -	—	—	—	—	—	—	100	0	0	125	0	0
Yorkshire - - -	10	10	0	17	10	0	57	10	0	82	10	0
Wales - - -	8	0	0	12	0	0	40	0	0	63	0	0
Average -	15	14	5¼	22	11	10¼	85	5	4¾	118	0	4

CONTINUED.

Communication.	Seed.						Manure purchased.						Team.					
	1790.			1803.			1790.			1803.			1790.			1803.		
	£.	s.	d	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d,	£.	s.	d.
Bedfordshire -	57	1	0	57	1	0	60	0	0	82	0	0	14	0	4	14	0	4
Buckinghamshire	—	—	—	—	—	—	—	—	–	—	—	–	—	—	–	—	—	–
Cheshire - -	15	7	0	15	7	0	15	0	0	20	0	0	—	—	–	—	—	–
Cornwall - -	80	0	0	80	0	0	300	0	0	400	0	0	25	0	0	32	10	0
Devonshire - -	—	—	—	—	—	—	3	3	0	3	15	0	90	0	3	120	0	0
Durham - - -	32	10	0	33	17	6	8	0	0	10	10	0	—	—	–	—	—	–
Essex - - -	39	10	0	44	10	0	10	0	0	15	0	0	37	10	0	56	10	0
Gloucestershire -	37	10	0	48	10	0	—	—	–	—	—	–	60	0	0	80	0	0
Hampshire - -	55	7	6	62	15	0	50	0	0	80	0	0	84	10	0	102	10	0
Herefordshire -	28	0	0	26	0	0	25	0	0	31	10	0	112	10	0	112	10	0
Hertfordshire -	46	17	0	48	5	0	66	0	0	92	5	0	76	0	0	94	0	0
Kent - - - -	57	5	3½	69	12	2½	27	10	0	42	10	0	125	14	4¾	170	5	7
Lancashire - -	61	8	0	75	18	0	74	10	0	157	10	0	117	10	0	157	10	0
Lincolnshire -	47	6	0	54	17	0	210	0	0	270	0	0	50	18	7	69	8	0
Norfolk - - -	30	6	0	33	13	0	10	16	0	13	18	0	46	10	0	54	16	8
Northamptonshire	72	5	0	72	5	0	20	10	0	27	10	0	43	0	0	47	5	6
Nottinghamshire	70	0	0	74	0	0	—	—	–	7	0	0	56	0	0	80	0	0
Northumberland	32	8	6	32	8	6	15	6	0	18	4	0	22	10	0	26	4	0
Rutlandshire -	46	15	0	46	15	0	15	0	0	30	0	0	75	0	0	80	0	0
Shropshire - -	24	0	0	24	0	0	20	0	0	30	0	0	40	0	0	50	0	0
Somersetshire -	45	13	3½	56	6	11¼	70	7	1	91	5	0	84	15	0	120	13	4
Suffolk - - -	37	1	11½	42	3	11	19	5	0	22	5	0	71	16	0	89	19	6
Surrey - - -	35	0	0	30	0	0	16	0	0	20	0	0	30	0	0	26	0	0
Staffordshire -	30	0	0	40	0	0	15	0	0	20	0	0	30	0	0	40	0	0
Wiltshire - -	85	0	0	79	0	0	—	—	–	—	—	–	—	—	–	—	—	–
Yorkshire - -	36	10	0	33	0	0	21	0	0	33	0	0	—	—	–	—	—	–
Wales - - -	53	0	0	48	0	0	53	0	0	53	0	0	60	0	0	62	10	0
Average -	46	4	10¼	49	2	7	48	0	3½	68	6	2	67	4	10	82	8	0¼

Communication.	Interest of Capital.						Total Expenses					
	1790.			1803.			1790.			1803.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
Bedfordshire -	25	0	0	30	0	0	490	8	9	605	1	6
Buckinghamshire	—	—	–	—	—	–	—	—	–	—	—	–
Cheshire - -	15	0	0	25	0	0	315	11	0	493	1	0
Cornwall - -	27	0	0	35	0	0	572	0	0	738	6	8
Devonshire - -	—	—	—	—	—	—	299	0	6	432	4	6
Durham - - -	12	10	0	17	10	0	288	15	0	402	13	6
Essex - - -	23	15	0	33	15	0	362	13	6	484	1	7½
Gloucestershire -	23	0	0	28	15	0	314	0	0	428	15	0
Hampshire - -	23	6	8	31	0	0	396	4	8	529	0	0
Herefordshire -	16	15	5	21	0	0	385	5	0	437	0	0
Hertfordshire -	25	5	6	33	19	6	386	13	2	538	19	5
Kent - - - -	32	10	3½	46	9	7	540	14	8¾	728	15	11½
Lancashire - -	56	5	6	98	6	9	699	7	11	1073	18	11
Lincolnshire -	18	4	7¾	25	7	3¾	332	5	1	472	5	4¼
Norfolk - - -	34	0	0	39	13	4	341	11	3¼	445	17	10¼
Northamptonshire	18	12	9	23	3	0	392	7	9	491	3	6
Nottinghamshire	16	14	11	25	1	4¾	278	17	11	526	9	4¾
Northumberland	24	10	0	30	8	0	316	15	0	396	8	6
Rutlandshire -	15	0	0	20	0	0	286	10	0	384	5	0
Shropshire - -	10	10	0	15	15	0	243	0	0	362	5	0
Somersetshire -	23	3	1¾	31	12	11¾	529	5	6¼	708	14	7½
Suffolk - - -	19	5	0	28	15	0	344	11	3	474	17	4
Surrey - - -	20	0	0	22	0	0	403	0	0	618	0	0
Staffordshire -	25	0	0	30	0	0	316	0	0	433	0	0
Wiltshire - -	25	0	0	31	5	0	447	10	0	548	15	0
Yorkshire - -	23	10	0	32	10	0	350	0	0	488	10	0
Wales - - -	11	0	0	15	0	0	292	0	0	433	15	0
Average -	22	11	11½	30	3	8¾	385	10	7¾	526	0	2

Recapitulation of the Rates per Cent. Increase or Decrease between the Year 1790 *and* 1803, *per Hundred Acres.*

Communication.	Rent.	Tithe.	Rate and Taxes.	Wear and Tear.	Labour.	Seed.	Manure purchased.	Team.	Interest of Capital.	Total Expenses.
Bedfordshire -	25	64 3/7	85 3/13	45	47	—	36 2/3	—	20	23 1/3
Buckinghamshire	30	30	30	30	30	30	30	30	30	30
Cheshire - -	20	25	25	47 6/7	25	—	33 1/3	—	66 2/3	56 1/4
Cornwall - -	33 1/3	33 1/3	33 1/3	33 1/3	50	—	33 1/3	30	29 17/27	29 1/3
Devonshire -	36	81 9/11	75	66 2/3	57 9/13	—	19 1/21	33 1/3	—	44 1/2
Durham - -	45	23 1/3	160	26 6/19	28 4/13	4 3/13	31 1/4	—	40	39 1/2
Essex - - -	22 6/7	18 8/19	94 21/51	33 1/3	26 1/5	12	50	50 2/3	42 2/19	33 1/2
Gloucestershire	33 1/3	25	107 14/27	30 3/5	34 2/7	29 1/3	100	33 1/3	25	36 1/2
Hampshire -	25 1/2	32 8/29	86 1/2	50 10/11	43 1/3	13 1/3	60	21 1/3	32 6/7	33 1/2
Herefordshire -	25	33 1/3	20	4 1/6	22 2/9	7 18/23	26	—	25 25/27	13 1/2
Hertfordshire -	50	60	132 13/16	34	57 1/13	3	39 51/66	23 13/19	34 1/3	39 1/3
Kent - - -	56 9/11	32 1/2	68 16/63	40 40/47	30 1/2	21 1/2	54 6/11	35 1/2	43	35
Lancashire -	41	17 1/2	137	63	52 1/2	23 63/103	111 1/2	34 2/47	75	53 1/2
Lincolnshire -	37	30 1/3	81	53 1/37	49 1/6	16	28 4/7	36 1/4	39 1/6	42 1/9
Norfolk - -	36 1/24	29	96	34 178/433	33	11 17/303	28 10/27	18	16 27/40	30 1/2
Northamptonshire	40	—	36 4/11	55 5/9	32 48/83	—	34 6/41	10	24 1/4	25 1/5
Northumberland	40	—	70 6/10	90 1/6	20 40/77	—	18 14/15	16 4/9	24 4/29	25 1/7
Nottinghamshire	22 2/9	17	62 1/2	49 1/2	49 3/4	5 5/7	—	42 1/3	49 3/4	39
Rutlandshire -	42 6/7	—	215 15/19	50	57 1/7	—	100	6 2/3	33 1/3	34 1/9
Shropshire -	50	114 2/7	114 2/7	50	66 2/3	—	50	25	50	49 2/27
Somersetshire -	35 1/2	50 2/9	68 1/2	56 1/2	22	38 1/2	29 3/4	42 1/3	36 1/2	34
Suffolk - -	38 22/27	39 23/43	107 5/6	54 26/31	42 12/27	14	12 5/7	25 22/91	45 45/47	37 3/4
Surrey - -	12 1/2	54 1/6	72 8/11	52 4/23	35 5/7	16 2/3	25	15 5/13	10	53 1/3
Staffordshire -	—	—	45 5/11	33 1/3	31 1/4	33 1/3	33 1/3	33 1/3	20	37 1/3
Wiltshire - -	25	8 4/37	17 1/7	—	25	7 47/97	—	—	25	22 7/17
Yorkshire - -	134 8/13	25	118 3/4	66 2/3	43 9/25	10 20/33	57 1/7	—	38 14/47	39 3/7
Wales - - -	30	46 2/3	142 6/7	50	50 3/4	10 5/12	65 5/8	4 1/6	36 4/11	48 1/3
Average -	38	38 2/3	85	46 1/4	39 1/2	16 1/3	48 1/3	27 7/18	35 1/6	36 7/9

Average Result per Hundred Acres.

	1790.			1803.		
	£.	s.	d	£.	s.	d.
Rent	88	6	$3\frac{1}{4}$	121	2	$7\frac{1}{4}$
Tithe	20	14	$1\frac{3}{4}$	26	8	$0\frac{1}{4}$
Rates	17	13	10	31	7	$7\frac{3}{4}$
Wear and tear	15	13	$5\frac{1}{4}$	22	11	$10\frac{1}{4}$
Labour	85	5	$4\frac{3}{4}$	118	0	4
Seed	46	4	$10\frac{1}{4}$	49	2	7
Manure	48	0	3	68	6	2
Team	67	4	10	80	8	$0\frac{1}{4}$
Interest of capital	22	11	$11\frac{1}{2}$	30	3	$8\frac{3}{4}$
£.	411	15	$11\frac{3}{4}$	547	10	$11\frac{1}{2}$
Being, in twenty-seven returns, an increase of		-		33 per cent.		

General Result.

Labour	47 per cent.
Artisans	41
Rent	$39\frac{6}{7}$
Tithe	$48\frac{1}{4}$
Rates	$89\frac{6}{7}$
Cultivation of arable land	38
Manure	$62\frac{2}{13}$
Average rise -	$52\frac{2}{9}$

The two Returns combined.

FIRST RETURN.

Rent	$39\frac{6}{7}$
Tithe	48
Rates	$89\frac{6}{7}$
Wear and tear, (being artisans' work)	41
Labour	47
Manure	$62\frac{2}{13}$

SECOND RETURN.

Seed	$16\frac{1}{7}$
Team	$27\frac{1}{19}$
Interest	$35\frac{1}{7}$
Being an increase of -	45 per cent.

SCOTLAND.

LABOUR.

Communication.	Price in Winter, 1790.	Price in Winter 1804.	Price in Summer, 1790.	Price in Summer, 1804.	Price in Harvest, 1790.	Price in Harvest, 1801.	Head Man's Wages, 1790.	Head Man's Wages, 1804.	Second Man's Wages, 1790.	Second Man's Wages, 1804.
	per week.	per week.	per week.	per week.	per week.	per week	per ann.	per ann.	per ann.	per ann.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	£. s. d.	£. s. d	£. s. d.	£. s. d.
East Lothian -	5 6	9 0	5 6	9 0	6 0	9 0	— — —	— — —	— — —	— — —
Ditto - -	9 0	10 0	10 0	10 0	15 0	18 0	8 8 0	8 8 0	7 0 0	7 0 0
Kincardine -	6 0	9 0	8 0	12 0	6 3*	10 0*	8 0 0	14 0 0	6 0 0	10 0 0
Mid Lothian -	5 0	10 0	6 0	12 0	7 6	15 0	8 8 0	16 16 0	5 0 0	12 0 0
Forfarshire - -	4 0	6 0	6 0	7 6	7 0	12 0	8 0 0	12 0 0	6 0 0	10 0 0
Berwickshire -	6 0	8 0	7 6	10 0	9 0	15 0	10 0 0	15 0 0	7 0 0	12 0 0
Selkirkshire -	5 0	7 0	6 0	11 0	6 0†	12 0†	7 7 0	13 10 0	— — —	— — —
Dumfriesshire -	5 0	7 0	6 0	10 0	7 6	12 0	8 0 0	14 0 0	6 0 0	10 0 0
Argyllshire -	4 0	6 0	6 0	9 0	6 0	9 0	5 0 0	7 0 0	4 0 0	6 0 0
Ditto - -	5 0	7 0	7 0	10 0	12 0	15 0	6s. per week	9s. per week	5s. per week	7s per week
Peebles - -	5 0	8 0	6 0	10 0	6 0	10 0	6 6 0	14 0 0	5 0 0	11 0 0
Aberdeenshire -	3 0	6 0	4 0	7 0	6 0†	9 0†	9 0 0	14 0 0	6 0 0	10 0 0
Ayrshire - -	4 0	8 0	7 0	12 0	9 0	16 6	10 0 0	17 10 0	6 5 0	13 0 0
Mearns - -	6 0	10 0	7 6	12 0	9 0	15 0	20 0 0	35 0 0	16 0 0	30 0 0
Dundee - -	6 0	7 0	8 0	11 0	9 0	14 0	20 0 0	30 0 0	14 14 0	25 0 0
Kelso - -	6 0	9 0	8 0	12 0	10 6	16 6	23 0 0	28 18 0	19 0 0	24 10 0
Haddingtonshire } Preston Kirk - }	5 0	9 0	5 0	9 0	4 6†	9 6†	— — —	— — —	6 0 0	10 10 0
Lothian - -	5 0	8 0	6 0	9 0	12 0	18 0	12 0 0	18 0 0	10 0 0	15 0 0
East Lothian -	6 0	9 0	9 0	12 0	12 0	15 0	18 0 0	32 0 0	16 0 0	28 0 0
Lanarkshire -	5 0	7 6	6 0	10 6	— —	— —	8 0 0	16 0 0	6 0 0	12 0 0
Ross and Cromarty	2 6	4 6	3 6	6 0	— —	— —	11 0 0	20 0 0	9 0 0	17 0 0
Aberdeen -	2 6	5 6	5 3	7 0	6 0†	12 6†	4 10 0	10 10 0	3 0 0	7 15 0
Mid Lothian -	7 0	9 0	9 0	10 6	9 0†	11 0†	— — —	— — —	— — —	— — —
Ditto - -	5 0	7 0	8 0	10 0	8 0	12 0	12 0 0	15 0 0	9 0 0	10 0 0
Ayr - -	6 0	7 6	8 0	9 0	9 0	10 0	— — —	— — —	— — —	— — —
Lanarkshire -	5 0	9 0	7 0	12 0	9 0	15 0	10 0 0	20 0 0	6 0 0	14 0 0
Dumfriesshire -	5 0	7 0	6 0	10 0	7 6	12 0	8 0 0	14 0 0	6 0 0	10 0 0
Ditto - -	5 0	9 0	6 0	12 0	7 0	12 0	6 0 0	10 0 0	3 10 0	7 0 0
Cromarty - -	2 6	5 0	3 0	6 0	3 0	6 0	25 16 0	37 18 0	12 0 0	20 0 0
Average -	5 0½	7 8½	6 6½	9 10¾	8 1	12 7¼	10 18 2½	17 14 0	7 19 8¼	18 11 0
Being a rise per cent. of	53		51 4/7		55 10/17		62½		132⅓	

* Board supposed. † With Board.

LABOUR CONTINUED.

Communication.	Reap Wheat, 1790.		Reap Wheat, 1804.		Mow Barley, 1790.		Mow Barley, 1804.		Thresh Wheat, 1790.		Thresh Wheat, 1804.		Thresh Barley, 1790.		Thresh Barley, 1804.		Filling Earth, 1790.		Filling Earth, 1804.		Filling Dung, 1790.		Filling Dung, 1804.	
	per acre.		per acre.		per acre.		per acre.		per Qr.		per Qr		per Qr.		per Qr.		per yard.		per yard.		per load.		per load.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d*	*s.*	*d.*	*s.*	*d*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
East Lothian	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ditto	12	0	12	0	9	0	9	0	2	0	2	0	2	8	2	8	—	—	—	—	—	—	—	—
Kincardine	5	0	8	0	—	—	—	—	1	0	6	0	0	8	1	0	—	—	—	—	—	—	—	—
Mid Lothian	5	0	10	0	4	6	8	0	1	0‡	0	9‡	1	0‡	0	9‡	0	1¼	0	1¾	—	—	—	—
Forfarshire	7	6	9	0	7	6	9	0	2	0	2	0	0	9	0	10	—	—	—	—	—	—	—	—
Berwickshire	8	0	10	0	—	—	—	—	2	0	2	6	1	3	1	6	0	4	0	6	0	2	0	3
Selkirkshire	—	—	—	—	—	—	—	—	—	—	—	—	0	9	1	2	—	—	—	—	-	—	—	—
Dumfriesshire	—	—	—	—	—	—	—	—	—	—	—	—	0	8	1	4	—	—	—	—	—	—	—	—
Argyllshire	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ditto	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	2	0	3	1	2	1	8
Peebles	7	6	10	10	6	9	9	7	1	3	1	6	1	3	1	6	—	—	—	—	0	1¼	0	2
Aberdeenshire	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ayrshire	6	6	13	0	6	0	11	3	1	0	2	0	0	10½	1	5	—	—	—	—	—	—	—	—
Mearns	7	0	11	0	6	0	10	0	2	0	3	8	2	0	3	8	0	1¾	0	3	0	1¼	0	2¾
Dundee	6	0	10	6	5	0	7	6	1	3	1	9	1	1½	1	6	0	4	0	6	—	—	—	—
Kelso	5	0	8	6	—	—	—	—	1	3	1	10	0	10	1	5	0	1½	0	2¼	—	—	—	—
Haddingtonshire Preston Kirk	—	—	—	—	—	—	—	—	0	10	1	8	0	10	1	8	0	2½	0	6	—	—	—	—
Lothian	—	—	—	—	—	—	—	—	1	0	3	0	0	8	2	0	—	—	—	—	—	—	—	—
East Lothian	8	0	11	0	3	0	4	0	1	4	3	0	1	0	2	0	0	1	0	1½	0	1	0	1½
Lanarkshire	—	—	—	—	—	—	—	—	—	—	—	—	1	6	2	6	—	—	—	—	—	—	—	—
Ross and Cromarty	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Aberdeen	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mid Lothian	—	—	—	—	—	—	—	—	1	4	1	8	—	—	—	—	—	—	—	—	—	—	—	—
Ditto	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ayr	10	0	10	0	—	—	—	—	2	0	2	4	2	0	2	6	0	2	0	2	—	—	—	—
Lanarkshire	8	0	12	0	—	—	—	—	2	8	4	0	—	—	—	—	—	—	—	—	—	—	—	—
Dumfriesshire	—	—	—	—	—	—	—	—	—	—	—	—	0	8	1	0	—	—	—	—	—	—	—	—
Ditto	8	0	15	0	—	—	—	—	2	0	2	8	—	—	—	—	—	—	—	—	—	—	—	—
Cromarty	7	0	10	6	—	—	—	—	2	0	4	0	1	8	2	6	0	3	0	5	—	—	—	—
Average	8	8¾	12	4¾	5	11½	8	3¼	1	6½	2	0¾	1	2	1	8¾	0	2¼	0	3½	0	3¾	0	5½
Being a rise per cent. of	42 $\frac{2}{419}$				39				33 $\frac{20}{37}$				48 $\frac{3}{14}$				55 $\frac{5}{9}$				46 $\frac{2}{3}$			

‡ Fallowing to thrashing mills.

Communication.	Blacksmith.								Carpenter.		Mason.		Thatcher.		Collar-mak. work.	
	Tire, 1790.	Tire, 1804.	Plough-Irons, 1790.	Plough-Irons, 1804.	Chains, 1790	Chains, 1804.	Shoeing, 1790.	Shoeing, 1804	By Day, 1790.	By Day, 1804.	By Day, 1790.	By Day, 1804.	By Day, 1790.	By Day, 1804.	1790	1804.
	per lb.	per lb.	per lb	per lb.	per lb.	per lb.	per lb.	per lb.								
	s. d	*s. d.*	*s. d*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s d.*	*s. d.*	*s. d.*	*s. d.*	*s d*	*s d*	*s. d*	*s. d*	*s. d.*
East Lothian -	doubled		doubled		— —	— —	— —	— —	inc. 40 per cent.		— —	— —	— —	— —	doubled.	
Ditto - - -	0 4	0 6	0 4	0 6	0 5	0 7	0 6	0 8	2 0	3 0	2 0	3 0	2 0	2 6	increased $\frac{1}{3}$	
Kincardineshire -	8 0[a]	12 0[a]	— —	— —	0 6	0 9	0 6	0 9	1 6	2 9	1 6	2 9	— —	— —	7 6[f]	12 0[f]
Mid Lothian -	0 3$\frac{1}{2}$	0 8	0 3$\frac{1}{2}$	0 8	0 3$\frac{1}{2}$	0 8	10 6[c]	16 0[c]	1 4	3 6	1 4	3 6	1 3	2 6	1 6	3 6
Forfarshire - -	0 3$\frac{1}{2}$	0 4$\frac{1}{2}$	— —	— —	0 8	0 10	3 6[d]	4 0[d]	1 2	1 8	1 2	3 0	1 0	1 6	— —	— —
Berwickshire -	increased $\frac{1}{3}$		increased $\frac{1}{3}$		0 5	0 8	10 6[c]	15 0[c]	1 6	2 0	1 8	2 6	1 6	2 0	increased $\frac{1}{3}$	
Selkirkshire - -	increased $\frac{1}{3}$		increased $\frac{1}{3}$		0 5	0 6$\frac{1}{2}$	0 6	1 0	1 4	2 0	1 6	2 6	— —	— —	near double	
Dumfriesshire -	— —	— —	— —	— —	— —	— —	0 6	0 9	1 4	2 4	1 6	3 0	1 6	2 0	1 0[g]	1 10[g]
Argyllshire - -	— —	— —	0 5	0 7	— —	— —	0 6	0 9	1 3	1 8	1 6	2 6	1 0	1 8	7 6	10 0
Ditto - - -	0 3$\frac{1}{2}$	0 4$\frac{3}{4}$	0 3$\frac{1}{2}$	0 4$\frac{3}{5}$	0 5	0 9	0 3	0 4$\frac{1}{2}$	1 6	2 3	1 8	2 9	1 2	1 8	1 8	2 0
Peebles - - -	0 3	0 4$\frac{1}{2}$	0 4$\frac{1}{2}$	0 6	0 5	0 8	2 0	3 0	1 6	2 6	1 8	3 0	1 8	2 6	3 0	4 0
Aberdeenshire -	0 0$\frac{1}{2}$	0 0$\frac{5}{4}$	0 4	0 6	0 5	0 7	2 0	3 4	0 10	1 8	1 0	2 6	1 6	2 0	1 0[h]	1 6[h]
Ayrshire - - -	0 4	0 6	0 5	0 7	0 6	0 8	0 6	0 8	1 6	2 6	1 6	3 3	1 6	2 9	trebled	
Mearns - - -	0 3$\frac{1}{4}$	0 4$\frac{1}{2}$	0 4	0 6$\frac{1}{2}$	0 6	0 9	2 0	3 8	1 6	2 6	1 8	2 5	1 2	2 0	inc. 30 per cent.	
Dundee - - -	0 3	0 6$\frac{1}{2}$	0 5	0 8	0 5	0 8	0 8	1 0	1 3	2 2	1 3	2 2	1 6	2 3	inc. 20 per cent.	
Kelso - - -	0 3	0 4$\frac{1}{2}$	0 4$\frac{1}{2}$	0 7	0 5$\frac{1}{2}$	0 8	0 4$\frac{1}{2}$	0 7	1 4	2 0	1 8	2 6	1 4	2 0	1 8	2 6
Haddingtonshire } Preston Kirk - }	— —	— —	— —	— —	— —	— —	— —	— —	0 10	2 0	1 6	3 0	— —	— —	3 0[i]	10 0[i]
Lothian - - -	0 4	0 6	0 4	0 6	0 6	0 10	— —	— —	1 6	2 6	1 6	2 6	1 4	2 6	36 0[k]	45 0[k]
East Lothian -	0 4	0 6	0 4	0 6	— —	— —	— —	— —	1 3	2 0	1 6	3 0	1 6	2 0	— —	— —
Lanarkshire - -	— —	— —	0 4	0 8	— —	— —	13 0[c]	19 0[c]	1 3	2 3	1 6	3 0	1 0	2 0	— —	— —
Ross and Cromarty	— —	— —	— —	— —	— —	— —	0 5	0 7$\frac{1}{2}$	1 0	2 0	1 0	3 6	— —	— —	— —	— —
Aberdeenshire -	— —	— —	— —	— —	— —	— —	— —	— —	1 0	1 4	1 4	2 9	— —	— —	— —	— —
Mid Lothian -	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	2 6	3 6	— —	— —
Ditto - - -	— —	— —	— —	— —	— —	— —	2 8	3 8	2 0	2 6	2 0	3 0	— —	— —	— —	— —
Ayrshire - - -	0 3	0 3$\frac{1}{2}$	0 3	0 3$\frac{1}{2}$	0 4	0 6	0 8	0 11	1 10	2 4	2 0	2 3	1 10	2 0	— —	— —
Lanarkshire - -	0 4	0 7$\frac{1}{2}$	0 4	0 7$\frac{1}{2}$	— —	— —	0 6	0 10	1 4	2 6	1 6	3 0	1 2	2 0	doubled	
Dumfriesshire -	— —	— —	— —	— —	— —	— —	0 6	0 9	1 4	2 4	1 6	3 3	1 6	2 0	— —	— —
Ditto - - - -	0 2[b]	0 3$\frac{1}{2}$[b]	0 1$\frac{1}{2}$[b]	3 3[b]	0 3[b]	0 4[b]	0 10[b]	1 0[b]	1 4	2 6	1 4	0 3	1 4	2 0	— —	— —
Cromarty - -	0 4	0 8	0 4	8 8	0 6	0 9	10 0[c]	15 0[c]	1 0	2 0	1 3	3 0	1 0	2 0	doubled	
Average -	—	—	—	—	—	—	—	—	1 4$\frac{1}{2}$	2 3	1 6$\frac{1}{4}$	2 9	1 5	2 1$\frac{3}{4}$	—	—
Being a rise per cent. of									63		81		51$\frac{8}{17}$			

[a] Putting on rings and bands. [b] For labour only. [c] Per horse. [d] Per set. [e] Per horse per ann.
[f] Cart saddle. [g] Harness per horse. [h] With board. [i] Per collar. [k] The articles of cart geer.

CULTIVATION.

Communication.	Expense of an acre of turnips						Expense of an acre of barley.						Expense of an acre of wheat.						Expense of manure.					
	1790.			1801.			1790.			1804.			1790.			1804.			1790.			1804.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
East Lothian	increased as 13 to 24						increased as 13 to 24						increased as 13 to 24						0	2	6	0	5	0
Ditto	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	1	6	0	5	0
Kincardineshire	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	1	8	0	2	6
Mid Lothian	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Forfarshire	0	12	0	1	4	0	0	12	0	1	4	0	1	0	0	1	0	0	—	—	—	—	—	—
Berwickshire	2	0	0	3	0	0	1	0	0	1	10	0	2	0	0	3	0	0	4	0	0	5	0	0
Selkirkshire	5	4	9	7	16	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dumfriesshire	2	10	0	4	0	0	—	—	—	—	—	—	—	—	—	—	—	—	2	12	0	5	4	0
Argyllshire	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ditto	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	0	0	4	0	0
Peebles	3	17	8	5	4	4	1	14	0	2	3	0	—	—	—	—	—	—	0	1	8	0	3	6
Aberdeenshire	4	10	0	9	4	0	1	4	0	2	0	0	—	—	—	—	—	—	—	—	—	—	—	—
Ayrshire	4	0	0	6	0	0	—	—	—	—	—	—	—	—	—	—	—	—	0	2	0	0	3	6
Mearns	4	0	0	9	0	0	4	0	0	9	0	0	5	0	0	10	0	0	0	10	0	1	5	0
Dundee	12	0	0	18	1	0	5	10	0	8	0	0	7	0	0	10	0	0	0	1	0	0	2	6
Kelso	1	13	6	2	8	6	0	18	6	1	3	0	2	14	3	3	14	0	0	8	6	0	13	6
Haddingtonshire	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Preston Kirk																								
Lothian	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	2	0	0	4	0
East Lothian	7	10	0	11	0	0	5	0	0	7	0	0	4	10	0	6	0	0	doubled					
Lanarkshire	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ross and Cromarty	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Aberdeenshire	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mid Lothian	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ditto	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ayrshire	5	0	0	6	0	0	4	10	0	5	10	0	4	15	6	6	6	0	—	—	—	—	—	—
Lanarkshire	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	0	0	4	6
Dumfriesshire	2	10	0	3	15	0	1	11	6	2	17	0	2	5	0	3	10	0	0	3	0	0	4	6
Ditto	5	0	0	8	0	0	1	10	0	2	0	0	7	0	0	10	0	0	0	0	8	0	4	0
Cromarty	3	4	0	5	8	0	1	3	4	1	15	9	2	13	8	4	6	3	0	15	0	1	10	0
Average	4	3	$2\frac{3}{4}$	6	11	$11\frac{3}{4}$	2	8	$8\frac{1}{2}$	3	15	$4\frac{1}{2}$	3	16	2	5	15	2	0	2	$7\frac{1}{2}$	0	4	$11\frac{1}{2}$
Being a rise per cent. of	$58\frac{1}{2}$						$54\frac{1}{2}$						$51\frac{1}{5}$						89					

RENT AND PARISH TAXES.

Communication.	Rise of Rent, from 1790 to 1804.	Parish Taxes. In the Pound, 1790.		Parish Taxes. In the Pound, 1803.	
		s.	d.	s.	d.
East Lothian	30 to 60	—	—	—	—
Ditto	20 per cent.	—	—	—	—
Kincardine	doubled	—	—	—	—
Mid Lothian	55 per cent.	—	—	—	—
Forfarshire	doubled	—	—	—	—
Berwickshire	doubled	—	1	—	3
Selkirkshire	as 25 to 43	—	—	—	—
Dumfriesshire	106 per cent.	—	—	—	—
Argyllshire	30 per cent.	—	—	—	—
Ditto	100 per cent.	—	—	—	—
Peebles	60 per cent.	—	—	—	—
Aberdeenshire	100 per cent.	—	10	1	6
Ayrshire	100 per cent.	—	—	—	—
Mearns	100 per cent.	—	—	—	—
Dundee	100 per cent.	—	—	—	—
Kelso	33 per cent.	—	4	—	7
Haddingtonshire	— — —	—	—	—	—
Lothian	100 per cent.	—	—	—	—
East Lothian	100 per cent.	—	—	—	—
Lanarkshire	33 per cent.	—	—	—	—
Ross and Cromarty	— — —	—	—	—	—
Aberdeenshire	35 per cent.	—	—	—	—
Mid Lothian	— — —	—	—	—	—
Ditto	— — —	—	—	—	—
Ayrshire	25 per cent.	—	—	—	—
Lanarkshire	100 per cent.	—	—	—	—
Dumfriesshire	100 per cent.	—	—	—	—
Ditto	40 per cent.	—	—	—	—
Cromarty	13*l* 6*s.* to 21*l*	—	—	—	—
Average	—	1	$7\frac{1}{2}$	2	11
Being a rise per cent. of	73		$69\frac{3}{13}$		

Communication.	Rent.		Rates and Taxes.		Wear and Tear.		Labour.	
	1790.	1803.	1790.	1803.	1790.	1803.	1790.	1803.
	£. s. d	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d	£. s. d.
Berwickshire	100 0 0	150 0 0	3 18 10	7 11 0	10 0 0	15 0 0	69 10 0	95 0 0
Per cent. rise	50		91½		50		37½	

CONTINUED.

Communication.	Seed.		Manure purchased.		Team.		Interest of Capital.		Total Expenses.	
	1790.	1803.	1790.	1803.	1790.	1803.	1790.	1803.	1790.	1803.
	£. s. d	£. s. d	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£ s. d.	£. s. d	£. s. d.
Berwickshire	49 10 0	66 0 0	30 0 0	37 10 0	10 0 0	15 0 0	15 0 0	20 0 0	287 18 10	406 1 0
Per cent. rise	33⅓		25		50		33⅓		41 1/5	

SCOTLAND. *Sketch of the general Result.*

FIRST LETTER.

Rent - - -	73
Rate - - -	69 3/13
Labour - - -	56 4/11
Artisans - - -	65
Manure - - -	89
Average increase -	70 per cent.

SECOND LETTER.

Only one from Berwickshire.

The average increase 45 7/9.

Additional Information communicated with the Particulars from which the preceding Tables were formed.

BEDFORD.

Mr. George Aikin.

Artificial manures are very rarely made use of. I have made trial of turf *ashes*, delivered at 5*d*. per bushel, 50 bushels per acre, and also *unburnt* turf-dust, delivered at 4*d*. and the same quantity per acre, with tolerable success; likewise *lime* 12 quarters per acre, delivered 3 miles, at 5*s*. 4*d*. per quarter with great effect; but the present price 8*s*. per quarter, is too high to allow the continuation of it. Wood of all sorts has risen so much in price since the war, that this kind of work has risen very considerably, at least 15 per cent.

Rev. Professor Martyn.

Sums raised for poor-rates, including other town charges, in the parish of Pertenhall, in Bedfordshire.

	£.	s.	d.
1790 - - -	150	11	0
1791 - - -	136	9	6
1792 - - -	159	5	0
1793 - - -	158	3	6
1794 - - -	163	18	6
1795 - - -	126	8	0
1796 - - -	136	10	0
1797 - - -	148	6	8
1798 - - -	120	1	$7\frac{1}{2}$
1799 - - -	200	3	$1\frac{1}{2}$
1800 - - -	318	12	$6\frac{1}{2}$
1801 - - -	320	4	0
1802 - - -	213	7	2
1803 - - -	213	1	3

Mr. Thomas Brown.

THE subject is complex and admits of many exceptions, but I have laid down one general rule in calculating an opinion on the value of land, which is, the expence of management (with some exceptions for localities) has increased *a full third* in every respect, where the consumption of the produce forms no part of the item, since 1790.

BERKSHIRE.

Mr. William Budd.

TALKING with Mr. Dingwood of Steventon, near Basingstoke in Hants, on this subject, in May 1804, he said that Mr. Hasher of Chinham near Basingstoke in Hants, a man of a very respectable character, a farmer, had lately assured him that he could prove by his accounts, that 30 years ago he made more profit by his farm, paying rent, than he should now were he to pay no rent at all; expences being so much increased.

BUCKINGHAMSHIRE.

Isaac King, Esq.

FROM the best accounts I can collect from intelligent farmers, and which I believe are true, the average advance of all the articles specified, is full 30 per cent.

CAMBRIDGESHIRE.

Rev. Joseph Scott, and Mr. John Smith.

THE late heavy tax on malt has had a great effect in lowering the price of barley, and consequently has had an influence in lowering most other grain.

Mr. Charles Wedge.

WE cannot let this opportunity pass, without mentioning to your Lordship, how much this country is injured by the very high tax on malt; we need not perhaps mention its partiality, as it is plain the grazing and cyder counties contribute but little towards it; and even the wheat, oat, and bean lands are not so materially

affected by it. We do not so much complain of the sum of money taken from us, by means of it, as we do, that it is the cause of lands being sown with improper crops, and prevents an immense consumption of barley in the way it ought to be used, namely, in *Malt*. The price of malt now entirely precludes the poor man, and the next class of housekeepers, from brewing, and is a strong inducement to the common brewers to give their beer an intoxicating quality *without malt*, as well as to encourage the use of spirits.

We are willing to pay the same quantity of money as we now do, and we are of opinion that it may be done by a commutation tax, that will fall more equally on the Public.

It may perhaps be found that the average tax paid on malt, by the landed property of this part of the country, amounts to about 5 per cent. on the rental. The rental of the kingdom will *now* be pretty well known; and if it is so, let 5 per cent. be laid on all occupiers both of land and buildings, down to 20*s*. a year, and let the master of every family who keeps male servants which are *constantly* employed in trade or agriculture, pay 40*s*. a piece for them. We think this would raise a sum sufficient to drop the malt tax *entirely*, which would enable all *descriptions* of men to make use of malt.

Rev. Abraham Jobson, Vicar of Wisbeach.

The Vicar of Wisbeach is obliged to John Edes, Esq. one of the most respectable and intelligent gentlemen farmers in the isle, for the inclosed answers. He and the Vicar both think, that all that Parliament can well do, "is to have the ports invariably shut against the importation of foreign corn, *or* cautiously opened for its importation, under certain judicious rules, which should be regulated by the average price of all the different sorts of corn, estimating the quality of such corn by its weight per bushel: *so that the farmer may live.*" There would then be a regular system of Agriculture; nor would grazing be neglected. Whereas, the farmers, now finding that they cannot pay their rents by the plough, are busy laying down their arable for pasture; and thus running, as the ports are opened, from one extreme to another, we shall soon have a scarcity of bread, and must send again millions of money out of the nation, to buy corn; while our valuable lands lie waste, and commons, to the disgrace of the proprietors, and not much to the credit of the legislators, for not enforcing their cultivation by heavy taxes, or some other mode of compulsion.

CHESTER.

John Thomas Stanley, Esq.

If throughout the kingdom, the prices paid for labour in the years 1790 and 1804, are as different as here, there will be a report which must prove the absolute necessity of legislative interference, in favour of the landed interest. No proposition can be more clear, than that the farmer must be ruined, if the rent he has to pay, the taxes he has to pay, the prices for labour he has to pay, are all to be encreased, without the prices for the produce of his farm encreasing at the same time, unless we suppose, his former profits to have been so great, as to allow still some balance to remain on the gaining side, after exposing them to so many deductions, which nobody does suppose.

In sending you the enclosed returns, I ought to observe, that the prices for almost every kind of labour are exceedingly fluctuating at this particular period. The old workmen in many instances submit to be paid the same wages as formerly, but the young and independant will be tied down by no rule. Their demands vary from day to day, not only for day wages, but for the pay of any measure work. They fly from place to place, and from job to job, certain always of being employed; two shillings a day may, however, be considered as the common price, both for summer and winter; more must be paid during the harvest, or else beer and ale must be allowed, which being taxed to the amount of three pence a quart, cannot be considered as an addition of less than 6*d.* a day.

The causes of the encreased and encreasing rate of wages are obvious, namely, the encreased price of living, and the diminution of husbandmen. The first cause needs no explanation; the second is owing to high wages paid in Cheshire and Lancashire for weaving and cotton spinning, which induces every man who has children to throw them into those employments; even grown up persons leave agriculture to follow them, and parish apprentices are so readily disposed of that way, that no other one is thought of. In a few years there will certainly not be husbandmen enough in this part for the common farming of the country, unless trade should decline; or such an increase of wages for husbandmen take place, as may tempt those who have left the fields to return to them. We should be wrong in considering high wages in themselves as an evil; a very large population receiving high wages, is a proof that a country is rich and industrious; the only thing to

be lamented is, that the farmer cannot afford to pay the same wages that a manufacturer can for a labourer of the same skill. But that he cannot, is owing to circumstances which admit of remedy. The farmer contents himself with the smallest profits on the employment of his capital and knowledge, of any speculator whatsoever; and it is doubtful whether he often would not be a richer man at the year's end had he received day wages for his labour, and placed the value of his stock out at interest, instead of trusting to land in his own hands for a return for both. The amount of his rent he knows must be as much as will give the landlord $2\frac{1}{2}$ or 3 per cent. for his money, should he have bought the land, or should the value of it be calculated; and he would be wrong if he considered the payment of it as a hardship: he may call it, if he pleases, the interest of capital employed in purchasing his farm for the time he is to occupy it. But if the price he has to pay for labour increases during his occupation of the land, without the value of his produce increasing also, and if taxes are so laid as to fall on the occupation of land heavier than on the other trades and concerns of the country, he has a right to complain, and to expect redress, if it can be afforded. The price of labour, it is evident, has increased without a correspondent increase in the principal production of the land, namely, corn, and the malt tax, the property tax, the land tax, the horse tax, the poor rates, the taxes for raising and maintaining the militia and army of reserve, the highway duty, and every tax, whether paid out of the county rate or otherwise, for the police of the country, besides many other charges, fall on the land in a very unfair proportion. Thus, the present system reduces itself to the absurdity and injustice of taxing the land which is to produce corn, as much as possible; and allowing the corn produced on land untaxed to be brought into our markets to prevent the consumer paying his share of the taxes imposed on the land of his own country. It is impossible for the English farmer, under his present circumstances, to afford his corn at the same price a foreigner can, or even an Irishman; his corn must pay him back many more expenses than the corn of any other country has to pay back to its producer. In justice, then, you must do one of two things, take all the taxes off which fall immediately on the corn grower, or give him the full advantage of his own market, as long as the country can produce a sufficiency for its own consumption. If you do neither, men of capital and superior knowledge will abandon country concerns; ignorant and poor labourers will, by degrees, occupy the place of our present farmers. They will gain their

end if they can gain a livelihood; profits will be out of the question. If corn will grow on their farms without much labour or preparatory expense, they will sow it; but they will content themselves with pasturage, whenever they find an exhausted or unwilling soil. The country will thus gradually become more and more dependant on other countries for its supply, and in a year of scarcity, when it will be too late, we shall be compelled to lament our bad and improvident policy.

CORNWALL.

Mr. James Chapple.

In the year 1790, good estates were let per year at about 20 shillings per acre; now they are let from 30 to 40 shillings, and the taker in general is burthened with repairs, rates, taxes, &c.

DEVON.

Mr. R. Hawkins.

Profits and expenses of an acre of wheat in 1790.

	£.	s.	d.	£.	s.	d.
Average crop 24 Winchester bush. at 7s.				8	8	0
Rent	1	2	0			
Tithe, at 2s. 3d. in the pound rent	0	2	5½			
Preparation, manure, seed, &c.	6	4	6			
Reaping	0	5	6			
				7	14	5½
Profit				0	13	6½

Profits, &c. of an acre of barley in 1790.

	£.	s.	d.	£.	s.	d.
Average crop 34 Winchester bushels, at 3s. 6d.				5	19	0
Rent	1	2	0			
Tithe	0	2	5½			
Preparation, seed, &c.	1	18	0			
Mowing	0	1	2			
				3	3	7½
				2	15	4½
Profit on two crops of corn in 1790				£.3	8	11

Expenses and profits of an acre of wheat in 1804.

	£.	s.	d.	£.	s.	d.
Rent	1	10	0			
Tithe, at 3s. in the pound rent	0	4	6			
Preparation, manure, seed, &c.	7	18	0			
Reaping	0	10	0			
				10	2	6
Average crop 24 Winchester bushels, at 7s.				8	8	0
Loss				£.1	14	6

Expenses, &c. of an acre of barley, 1804.

	£.	s.	d.	£.	s.	d.
Rent	1	10	0			
Tithe	0	4	6			
Preparation, seed, &c.	2	18	0			
Mowing	0	2	4			
	4	14	10			
Average crop 34 Winchester bushels, at 2s. 9d.	4	13	6			
				0	1	4
Loss on two crops of corn in 1804				£.1	15	10

Note—There is nothing charged in the foregoing account for carrying the corn to the barn or stack, nor for threshing, as the straw is generally supposed to be worth nearly as much as these expenses amount to.

It may not, however, be unnecessary to state, that the crops of grain, according to the common husbandry of this neighbourhood, are always taken immediately following each other: wheat first, and barley the following year, with grass seeds, which are once mown for hay, and then permitted to remain as a temporary ley for two, three, or four years. Sometimes a third crop of barley or oats is taken the following year, in which case the best farmers generally lay on about half the former quantity of manure, which is called dressing for the last crop; and if care be taken to clean the land by ploughing, &c. as soon as possible after the former crop is carried off, the soil is not injured, nor the young grasses the following season; yet, according to the present prices of grain and labour, the crop must turn out unprofitable.*

Mr. John Prideaux.

From the great scarcity of manure in this country and great part of the east of Cornwall, our arable land is attended with great expense in cultivation; as near 20 miles around Exeter, on the north and west part, the lime rock is brought in barges from Torbay in the Channel to the river Ex, there burnt into lime, and carried into many parishes at least 20 miles from Exeter; the lime rock in the interior of Devon is worked at a great expense, and the culm is brought from Wales to Biddeford, to the river Tamar, and to Exeter, thence brought more than 20 miles to the kilns. The farmers can have but one turn per day for their cart or waggon, and it is in general carried to the distance of 8 and 12 miles from the kiln; for which cause the expense on manures is too great, even in our fine rich land in this neighbourhood; but in most parts of Devon, where thousands of acres lie uncultivated, and the price of labour so high, the farmers in general, who are mostly lessees, do not improve because of the expense, and cannot procure sufficient manure for their lands. In the south of Devon, where lime rocks are plenty, and contiguous to the coast, the farmers carry on an acre of land from 70 to 80 bushels double Winchester; in many places the crops are more abundant than in the interior, but their wages are higher and lands dearer per acre, though their soil is not so good as ours, except some parishes. On the north of Devon the lime is brought from Wales, and burnt at various places on the coast, at least from 20 to 25 miles in the interior.

* So it ought to do. Very bad husbandry.

Charges on a Farm of about £100. per Annum, Arable Land, in 1790, the Family to consist of 10 People.

	£.	s.	d.
General consumption of liquor is about 20 hogsheads of beer, five bushels of malt to the hogshead, at 5*s.* 6*d.* per bushel, and 1½*lb.* of hops -	29	0	0
Smith's bill for shoeing 5 horses, 15*s.* per horse per ann. plough work, wheel work, &c. total amount per ann. full - - - - -	10	0	0
Collar-maker's bill per ann. for 4 horses, £1. 1*s.* per ann. - -	4	4	0
Poor rates in this parish 1790, 78, at 3*s.* per rate - - £11 14*s.*			
Way rates, ditto, 18, - - - - 2 14			
Church rates, ditto, 6, - - - - 0 18			
	15	6	0
Tithe for £100. per ann. 2*s.* 6*d.* in the pound, according to covenant composition, besides pig, goose, and honey - - - -	12	10	0
Lime for 15 acres, to be tilled to wheat, on an average 30 bushels double Winchester per acre 450 bushels			
—— for repairs of house, 10			
—— 460 bushels, at 1*s.* 4*d.* per bushel at the kiln	30	13	4
N. B. The dung is generally carried on the land for a turnip crop, and if any surplus it is applied to top dressing.			
The 30 bushels of lime is for two crops only, a wheat and barley; if a third crop is taken, the lessee is to carry 40 bushels per acre, though but seldom done.			
Horse tax, for a hackney horse, in 1790 - - - -	1	5	0
Labourers, about 3 men throughout the year, besides 4 apprentices imposed by the parish on every £100. per ann. the labourers 6*s.* per week each, 18*s.* total 48 weeks - - - - - - -	43	4	0
Liquor reckoned above.			
Harvest month, 5 men employed, meat and liquor 24 days at 20*d.* per day for 5 men each - - - - - - -	10	0	0
Mason, carpenter, thatcher, 70 days in the year.			
I think this is rather under - { Carpenter 30 days, Thatcher 30, Mason 10 } —70 at 1*s.* 4*d.* per day	4	13	4
One quart per day to each man and above.			
Canvas for family, 7 yards to each per ann. with other purposes included, 100 yards, at 9*d.* per yard - - - - - -	3	15	0
Men, women, and boys' shoes, twenty pair yearly, at 4*s.* 6*d.* per pair -	4	10	0
Bags, ropes, and other necessaries - - - - -	2	0	0
For the apprentices, Russia drab, 6 yards for each apprentice, 24 yards, at 1*s.* 4*d.* per yard - - - - - - -	1	12	0
Salt for the family, about 4 *cwt.* at 14*s.* per *cwt.* - - -	2	16	0
Sundry expences in going to market; nails, timber for hurdles, timber for wheel and plough work, which cannot be less - - -	10	0	0
	185	8	8
Besides clothing for the family, meat, and other necessaries.			
The family, the farmer, wife, 3 children, 4 apprentices, and maid.			
Farrier's bill, per annum, about - - - - -	1	10	0
	£.186	18	8

Charges on the same Farm in 1804, *in Addition to the Charges in* 1790, *by the Advance of Taxes, &c.*

	£.	s.	d.
In addition to the former calculation on 20 hogsheads of beer, by means of duty on malt and hops since that date, advanced 3*s.* per hogshead, on 100 bushels of malt for 20 hogsheads - - - - - -	15	0	0
On smith's work advanced - - - - - -	5	0	0
On collar-maker's, for 4 horses, 10*s.* per horse - - -	2	0	0
In 1804, poor rates 168 / In 1790, poor rates 78 } 90 rates, at 3*s.* per rate. This advance chiefly owing to militia. County rates, army of reserve, to the poor for advance of necessaries, as salt, canvas, candles, soap, &c. - - -	13	10	0
Tithe on £100. per ann. in 1790, £12. 10*s.* 0*d.* / Tithe on the same estate in 1804, now £150. per ann. per pound, composition, at 3*s.* 6*d.* - 26 5 0 } advanced -	13	15	0
On manure for 15 acres, at 30 bushels per acre, 450 / for houses - - 10 } 460, at 4*d.* per bushel	7	13	4
Duty on horses, 15*s.* on a hackney - - - £0. 15*s.* / on 4 for farm, at 12*s.* 6*d.* - - - 2 10	3	5	0
Labourers, or 3 men employed throughout the year, 1*s.* per week each -	7	4	0
For 5 men in harvest month, advanced 4*d.* per day for each man 24 days, at 1*s.* 8*d.*	2	0	0
For mason, carpenters, thatchers, 8*d.* per day for 70 days - -	2	6	8
Advanced duty on salt, and the price in 1790 14*s.* per *cwt.* In 1804, 30*s.* per *cwt.* Consumed at least in 10 to family, and for pickling wheat, &c. 16*s.* on 4 *cwt.* - - - - - -	3	4	0
Advanced on canvas, reckoning 100 yards for the yearly consumption, in 1790 9*d.* per yard, in 1804 16*d.* per yard, difference - -	2	18	4
Advanced on shoes, 20 pair yearly, at 3*s.* per pair, with soleing -	3	0	0
——— on Russia duck, for apprentices, 8*d.* per yard on 30 yards, for coats, waistcoats, and breeches - - - - -	1	0	0
Property tax on £150. per ann. 9*d.* per pound - -	5	12	6
Advanced on sacks, cordage, ropes, nails, &c. - -	2	0	0
	88	8	10
Farrier advances about per annum - - -	0	10	0
	£.88	18	10

54 Per cent. advance.

I beg leave to observe, that the county of Devon, if properly cultivated, and manure could be in greater plenty, that this county would produce double the quantity of corn it now does; but the great interruption to agriculture is from tithe; for although no man venerates the profession more than myself, yet their demands (I must say) are too great; therefore in many parishes tillage is neglected, and great extent of lands lie uncultivated. I mention this cause, for it would be prudent in the Legislature to use every means that a supply of corn sufficient for the

inhabitants of this kingdom be produced within the kingdom. There is another cause which requires the interference of the Legislature; which is, that the measure by which lime is measured should be a regular double Winchester, which is, I think, 12 inches deep and 24 inches in diameter, to be perpendicular on the inside; whereas the measure now used through all the interior is a measure about 12 inches in diameter at the top and about 24 inches at the bottom. By this means the farmer is cheated in his measure very considerably, as lime is heap measure, the same as coal. There should be an act to enforce a heavy penalty; the justices at the Quarter Sessions should be empowered to send inspectors, (say the inspector of bridges,) and examine the several measures at the kilns, and if convicted before one magistrate, the person so offending should be punished.

On a Farm of £100. per ann.	£.	s.	d.
Charges on arable land in 1790, as per annexed statement -	186	18	8
Rent - - - -	100	0	0
£.	286	18	8

Without interest of money, and necessaries for the farmer and his own family.

On the same Farm in 1804, now £150. per ann.	£.	s.	d.
Advanced charges since 1790, by taxes, wages, &c. - -	88	18	10
The charges in 1790 to be added	186	18	8
	275	17	6
Rent in 1804 - -	150	0	0
	425	17	6
Rent and charges in 1790 -	286	18	8
Increased in charges and rent	£. 138	18	10

I have examined my books relative to the several prices of the produce:

In 1790.	bush. Winch. s. d.	s. d.
I sold my wheat at Exon, best white wheat, at - - -	6 0 to	6 6
Red wheat, at - - -	5 0 to	5 3
Barley I sold in 1790 for -	3 0	
Best ditto, for seed - -	3 6	

In 1804.	bush. Winch: s. d.
Good white wheat - -	6 6
My best ditto - - -	7 0
Barley - - - -	3 6
Seed barley - - -	4 0

What then is to meet the great advance on charges?

'Say a farm, as above, to keep from 35 to 40 yeaning ewes, and to have so many lambs yearly to breed, which, at present, may make about 21*s.* when fat more than they did at that time.

	£.	s.	d.
35 to sell yearly, at 21*s.* more than in 1790 - -	36	15	0
On the wool, about $2\frac{1}{2}$ packs yearly, say 3 packs, at 2*d.* per lb. advance	6	0	0
£.	42	15	0

No advance on pigs, and barley and wheat little difference from what it was in 1790. The farmer may get or not get by his plough-oxen that he buys, or may breed four or five bullocks yearly, but on arable farms the plough-oxen are generally bought in, and sold again when the spring ploughing is over.

On a grazing farm the advance on rent can be better doubled, as they are at but little expense for labour; but if no demand, such farms I have known very unproductive; however, the war hath been in their favour. The breeding farms have had some advantage for a few years past; but the last year and the present time are much against them. On the whole, it is my firm opinion, that farms are not really more worth for a term of 14 years to come, than they have been for 14 years past, nor even so much, and the tenantry must give up.

DERBYSHIRE.

Joseph Wilkes, Esq.

I CAN for the present say no more than from 1790 to 1804 the advance of wages, &c. is on the whole about one-third more.

DORSETSHIRE.

Mr. George Boswell.

A GREAT deal of the wheat is mown, which was formerly reaped: this is found advantageous to the farmer, for when the wheat is fit to be put into the band the women are employed to do it, and a great many acres are secured in a few days. The like observation may be made on the barley; for, excepting mowing it, the other part of the work is done by the women.

DURHAM.

Sir John Eden.

THRESHING machines in this country are much in use, and enable the farmers to get their corn from the straw at a much cheaper rate. Their cost from £40. to £100. and their powers seem to improve; I mean that the mechanic has improved

on the original. They likewise winnow the corn; and I have a straw-cutting engine which, at another time, is worked by the same axle-tree, &c. and I save much by chopping the oat straw, which is very little, and sometimes not at all, threshed, and is very nutritious.

ESSEX.

Mr. George Pung, jun.

Expence of Turnip Crop.	1790. £.	s.	d.	1804. £.	s.	d.
Ploughing, five times	0	17	0	1	5	0
Seed, sowing, and harrowing	0	3	0	0	4	3
Hoeing	0	4	0	0	6	0
Filling, spreading, and carriage of muck	0	7	6	0	10	6
Rent, rates, and tithe	0	17	6	1	10	0
	2	9	0	3	15	9
Expense of Barley after Turnips, or Wheat after Clover.						
Ploughing, harrowing, sowing, and rolling	0	5	6	0	8	3
4 Bushels seed barley, $2\frac{1}{2}$ wheat	0	11	6	0	10	6
Harvest, including horses and waggons	0	9	0	0	14	0
Threshing and delivering crop	0	9	0	0	13	6
Rent, rates, and tithe	1	2	0	1	16	0
	2	17	0	4	2	3
Expense of Barley or Wheat after Summer Till.						
Ploughing, five times, and harrowing	0	17	0	1	7	0
Land-ditching	0	5	6	0	8	0
Filling, spreading, and carriage of muck	0	7	6	0	10	6
Ploughing, sowing, harrowing, and rolling	0	4	6	0	6	6
4 Bushels seed barley, $2\frac{1}{2}$ wheat	0	11	6	0	10	6
Harvest, including horses and waggons	0	10	0	0	16	0
Threshing and delivering crop	0	10	0	0	15	0
Rent, rates, and tithe, for two years	2	4	0	3	12	0
	£.5	10	0	8	5	6

Montagu Burgoyne, Esq.

I BEG leave to mention, that I believe that the prices which I have returned are correct, as to the neighbourhood of Harlow, where I live, as I have kept regular accounts of my farming disbursements for the last seventeen years; and I am sorry to observe, that on the whole, I do not believe that there was ever a more unprofitable year to the agriculturist in this part of the country, as to expense and profit. The expense of labour is now very high; but it is impossible to guess to what price it will rise during the summer, for such is the scarcity of farm labourers, that they may ask any price they please. This is the universal complaint of the farmers in every part of the county of Essex; a complaint which, I fear, is more likely to increase than to be diminished.

I have placed a very high price for the culture of an acre of turnips, because I have allowed twenty loads of rotten dung per acre, which cannot be less than 4*s.* per load. I have fixed no price for the culture of an acre of wheat or barley, because it is not well possible to do it, with any degree of accuracy, without the whole train of crops, which vary very much in different parts of the country; but I can venture to give my opinion, that in a moderate year, barley cannot be grown for less than 30*s.* per quarter, and wheat for less than £3. 3*s.* per quarter, to pay the grower for his labour, with a due return for his capital expended. The increase of all expense which falls on the agriculturist since the year 1790 cannot be reckoned less than 30 per cent.

GLOUCESTERSHIRE.

Mr. Edward Turner.

THERE has been very little reduction in the price of labour since the return of cheap times, nor will, most likely, till a settled peace makes hands plenty. Corn this year has been considerably lower than in 1790, and bacon meat as cheap; some necessary articles of consumption to the labouring class as dear as ever; shoes 10*s.* 6*d.* a pair, instead of 6*s.* 6*d.* and soap, candles, salt, &c. materially advanced.

The owners of tithe have not been idle in the period referred to: I might possibly have stated one-half advance without exceeding the truth. Among the many

discouragements to agriculture, occasioned by tithe, it is not the least, that it takes the tenth of the gross produce, without any reference to the expense of raising it; and, by that means, falls heaviest on the most industrious, and effectually bars the improvement of much land, which would otherwise be cultivated to the advantage of the owner and the public.

There arose a considerable competition for farms about the year 1790, which, aided afterwards by the high price of produce, has advanced land to the full value, and, in many instances, perhaps, higher; some symptoms of decline are already observed; corn at present does not pay its expenses; if live stock should fall in price equally, which, in the opinion of many, is likely to be the case, many occupiers of farms in this country will not clear their expenses, much less repay themselves for their labour and interest of capital.

It appears to be the general opinion of the best informed men I have conversed with, that under the great advance of rent and charges of all sorts, wheat cannot be sold for much less than one shilling per gallon, and barley for half that price, to ensure a fair profit to the growers of it.

Mr. John Edmonds.

I AM certain that the expense is full one-third more in all things necessary to the cultivation of arable lands than in 1790.

HERTFORDSHIRE.

Mr. Richard Whittington.

Turnips.	1790.	*Turnips.*	1804.
	£. *s.* *d.*		£. *s.* *d.*
PLOUGHING the fallow 5 times and the necessary harrowing, at 7*s* 6*d* per acre for each ploughing, &c.	1 17 6	Ditto, at 10*s.* per acre -	2 10 0
Manure, 10 loads, at 5*s.* per load	2 10 0	Ditto, at 7*s.* per load -	3 10 0
Filling, carting, and spreading the same, at 1*s.* 6*d.* per load -	0 15 0	Ditto, at 2*s.* 6*d.* per load -	1 5 0
Seed, and sowing - -	0 2 6	Ditto - - -	0 3 6
Hoeing - - -	0 4 6	Ditto - - -	0 6 0
	£.5 9 6		£.6 14 6

Barley, after Turnips.	1790. £. s. d.	*Barley, after Turnips.*	1804. £. s. d.
Ploughing - - -	0 7 0	Ditto - - -	0 10 0
Seed, and sowing of ditto -	0 13 0	Seed barley cheaper than in the year 1790 - -	0 11 6
Harrowing and rolling -	0 2 6	- - - -	0 3 6
Weeding - - -	0 1 0	- - - -	0 1 6
	1 3 6		1 6 6
Barley, after Winter Fallowing.		*Barley, after Winter Fallowing.*	
Thrice ploughing and harrowing	1 2 6	- - - -	1 10 0
Manure - - -	2 10 0	- - - -	3 0 0
Seed, and sowing - -	0 13 0	- - - -	0 11 6
Weeding - - -	0 1 6	- - - -	0 2 0
	4 7 0		5 3 6
Wheat, after Clover.		*Wheat, after Clover.*	
Ploughing and harrowing -	0 10 0	- - - -	0 13 0
Seed, and sowing - -	0 15 6	- - - -	0 15 6
Manure - - -	2 0 0	- - - -	2 10 0
Weeding - - -	0 1 0	- - - -	0 1 6
	3 6 6		4 0 0
Wheat, after Summer Fallowing.		*Wheat, after Summer Fallowing.*	
Ploughing five times and harrowing	1 17 6	- - - -	2 10 0
Manure - - -	2 10 0	- - - -	3 0 0
Seed, and sowing - -	0 15 6	- - - -	0 15 6
Weeding - - -	0 1 6	- - - -	0 2 0
	£.5 4 6		£6 7 6

It is to be observed, that the land after turnips, or clover-ley, is not so subject to weeds as after fallowing; hence the expense of weeding is of course less.

J. Russell, Esq.

Manure for Meadow Lands, viz.

BURNT bones formerly 9*s.* per chaldron, but now 16*s.* in London. Sugar boilers scum 10*s.* per load, but now 20*s.* and scarce.

For Arable Land.

Raw bones 9*s.* per load, but now not to be had. Night soil 10*s.* per load, now a guinea.

Mr. Thomas Pickford.

Average Price of St. Alban's and Hemel Hempsted Markets, Herts:

	1790. £. s. d.	1803. £. s. d.
Wheat, per load	1 10 6	1 12 0
Barley, per quarter	1 3 6	1 2 0
Oats, per quarter	0 19 0	1 0 0
Peas, per load	1 1 0	1 4 0

HEREFORDSHIRE.

Thomas Andrew Knight, Esq.

Where the quantity of tillage has remained undiminished, and a new incumbent has taken possession, the tithes, on an average, have probably increased from thirty to 50 per cent. but the rapid decrease of tillage, owing to the price of labour and timber, (which has increased fifty per cent. and upwards within the last seven years;) the effects of the tithes themselves, as a tax, almost exclusively on tillage, and the labour and risk of tillage; the tithe of the wheat crop, taking its diminished breadth, is probably greater than I have stated. In one instance which has come within my own knowledge, the tithes have increased, within the last fourteen years, £556. per cent. The land is in common fields; but exchanges are making, and much will be converted to pasture. The sum at which the tithes in this case are valued, is not acceded to by the farmer.

KENT.

J. R. Head, Esq.

It is my most firm opinion, that if the prices of corn continue for a year longer at the same rate they now are, it will be impossible, by any skill or industry, to make the produce of the land reimburse the expenses of its cultivation. It is in this neighbourhood a received axiom, that the finances of the farmer are at this moment as low as in common years only arrives at the end of the corn harvest, and that half their tradesmen's bills, at least, are unpaid; so that unless some relief be granted

them, to stop the importation of corn, to a certain degree, the payment of rent will soon be a thing quite out of question.

Mr. J. Boys.

WHERE town or other expensive manures are procured and laid on for the wheat crop, the expence must be considerably more than £10. per acre.

Thomas Brett, Esq.

Expenses of Turnip Fallowing, per Acre:

	£.	s.	d.
FOUR times ploughing, at 10*s.*	2	0	0
Harrowing and dressing down	0	10	0
Manure, and spreading 42 cart loads per acre, at 3*s.* per load	6	6	0
Seed, and hoeing	0	9	0
	£.9	5	0

I stated the particulars of the expense of raising one acre of turnips, and I have made no statement of the expense of a crop of barley or wheat, which I thought would be better answered by stating my mode of cultivating my farm, when you will be able to judge in what proportions to divide the expense of the turnip crop on each succeeding crop, each crop receiving a proportionate benefit.

Turnip fallow, turnips fed off.

Once ploughed,	Barley.
Once ploughed,	Beans.
Once ploughed,	Wheat, (sown with clover.)
Feder mowed for hay,	Clover.
Once ploughed,	Wheat.

H. Godfrey Faussett, Esq.

THE calculation of the expense of keeping a team of 4 horses, in 1790, £120.
in 1804, £150.

A team horse, in 1790, £15. to £20.
in 1804, £25. to £40.

Mr. Henry Smithe.

I MAY observe, that the increased rates of labour and other charges on arable land, (particularly the poor, stubborn, and flinty soils in this part of the country), combined with the very low prices of corn, has occasioned a very large proportion of land in cultivation to be laid down with sanfoine and grasses this spring, at least in this neighbourhood; and, if very generally the case, there seems little doubt but that we shall again be visited with periodical returns of a scarcity of corn, if some means are not devised to ensure the farmer a steady fair price, adequate to his industry and exertions. That such most beneficial measure may be effectually accomplished by the Committee of the House of Commons, now sitting, I look forward to with hope and confidence.

LANCASHIRE.

Dr. Campbell.

THE expense of raising a crop of turnips will vary much, according to the nature of the soil, and the purposes to which it is to be applied.

If it be intended that it should be fed off with sheep on the ground, a less quantity of dung, or compost manure, which constitutes the greatest part of the expense, will be required. A larger quantity of dung than what I have put down may be used with advantage; but this is the common rate of preparing a crop of turnips, in such a way as to allow the turnips to be carted off, and yet leave the land in a state to carry subsequent crops.

	£.	s.	d.
Rent per customary acre (7840 yards)	3	0	0
Ploughing, three times	1	10	0
Three harrowings	0	15	0
Compost manure, of dung, lime, and earth	7	0	0
Hoeing and seed	0	12	0
£.	12	17	0

This applied to statute measure will be nearly £7. 10*s.* the acre.

Turnips are also raised upon *moss* lands, by *paring* and *burning*; and although

the crop be not so certain as on the hard land, yet in favourable seasons it will prove very good, and at a much less expense, viz.

	£.	s.	d.
Paring, or push-ploughing, per acre	0	16	0
Burning	0	10	0
Ploughing	0	12	0
Seed and hoeing	0	10	0
£.	2	8	0

Supposing *barley* to be taken *after oats*, the expense of preparing a customary acre, upon the common hard land, will be nearly

	£.	s.	d.
Rent	8	0	0
Manure	7	0	0
Seed (3 Winchester bushels)	0	12	0
Harrowing, rolling, and sowing	0	11	6
£.	11	3	6

or about £7. per statute acre.

If *wheat* be taken after a *naked fallow*, or, as it is called here, a *summer working*, the expense of a customary acre will be nearly as follows:

	£.	s.	d.
Two years rent of the land	6	0	0
Four ploughings, at 12*s.*	2	8	0
Manure*	5	0	0
Seed (3 Winchester bushels)	1	4	0
Sowing, harrowing, and rolling	0	11	6
£.	15	3	6

about £9. the statute acre.

Where a command of dung admits the practice, there can be no doubt but that preceding the crop of wheat by potatoes would be as much for the advantage of the farmer as the public; since the potatoes would, in the first instance, repay, with

* Upon the subject of *manure* there is a great difference, according to the nature of the soil. After working the land into a fine tilth, by repeated ploughings, some soils will require very little manure, whilst others will take nearly as much as for turnips or barley.

perhaps a considerable profit, the whole expense of preparing the land, if the crop could be disposed of as food for man; and if distance from a market, or other circumstances compelled him to apply it to feeding cattle, the profits arising from the increased value of his stock, and the quantity of manure raised, would, at the worst, nearly reimburse him for the expenses incurred. It seems a public misfortune that an idea should have ever been entertained and acted upon, that potatoes impoverish the soil on which they are grown. Universally when potatoes are raised with the due quantity of manure to insure the cultivator a good crop, the land will be left in a state to carry as many succeeding heavy ones as from any other method that has been devised, to convert poor exhausted soils into a state of fertility. I have now some fields of this description, which were, seven years ago, let for about ten shillings the statute acre. They were broken up and sown with oats, producing miserably thin crops. The land was then properly prepared for potatoes, and produced very plentifully, repaying every expense, with a good profit. Wheat and clover seeds were then sown, at no greater labour than a single ploughing and rolling. The wheat produced was as good a crop as any in the country, and I sold the clover and fog the following year for more than £6. the same acre.

I have stated *dung*, when good, to be worth about 6*s*. per ton; of course, when produced on a farm, it may be estimated of as much value.

Marl, when at hand, is much used in raising corn crops, and in improving moss and light soils. The expense of using it will depend greatly upon the distance from the pit. The general rule for mailing is, at the rate of 4 falls or perches of 64 cubic yards to our customary acre; but some use a greater quantity. I have before stated that the *filling* will be done at 20*s*. the fall, and the *spreading* may amount to one-third of that sum; the rest will depend upon the distance of the pit.

The expense of *lime* varies exceedingly, from the vicinity of the coals, and the distance from the kilns. The *windle*, or three Winchester bushels, can scarcely be obtained at present at any of the kilns for less than ten-pence, and to this must be added the charge of carting.

Upon the whole, the advance upon labour, and almost all the other articles, of which an account is required by the Board, since the year 1790, appears to be about one-third.

Mr. Henry Harper.

MANURES in 1790, horse, cow, and butcher's dung, from 5*s.* to 6*s.* per ton; night soil, coal ashes, and sweepings of streets, 2*s.* to 2*s.* 6*d.* per ton. In 1804, horse, cow, and butcher's dung, from 10*s.* to 12*s.* per ton; night soil, coal ashes, sweepings of streets, 4*s.* to 5*s.* per ton is now about the average price. In the spring of the year 1796, horse, cow, and butcher's dung sold as high as 15*s.* and 16*s.* per ton; in the spring of the year 1800 and 1801 it again sold at 15*s.* and 16*s.* per ton.

Prices of Wheat in the Year 1790.

	s.	*d.*		*s.*	*d.*
January - -	8	4	July - -	9	0
February - -	8	1	August - -	8	6
March - -	8	0	September - -	8	1
April - -	8	6	October - -	7	4
May - -	9	0	November - -	7	6
June - -	9	0	December - -	7	8

C. H. BLUNDELL.

The person I allude to, who has signed his name to the above, is a respectable dealer in Liverpool, both in corn and flour, by wholesale and retail. The prices at the rate given in each month are for country wheat, bought from farmers by weight, at 70 pounds per bushel; which, the average price for each month throughout the year, is 8*s.* 3*d.* per bushel, or 53*s.* $7\frac{112}{560}$*d.* per quarter, which is 1*s.* 7*d.* and a fraction dearer in the year 1790, than the present price of 1804.

I can remember, when a boy, so long as forty-four years since, going with my father to a neighbour's to buy some horned cattle, which were from two to three, four, and five years old, which were then bought from two to three, four, and five pounds per head, and under that price, but according to their being well made, size, and bone; I being then of years to notice which were handsome and well made from those that were ill shaped. But at that time butter sold, in Liverpool market, from $4\frac{1}{2}$*d.* to $5\frac{1}{2}$*d.* the pound, of 18 ounces. My remark on this, from that time to the present is, that as butter has either gradually or rapidly risen in price, in the course of twelve months or less that cattle has done the same in proportion; and that as many pennies per pound as butter sold for at Liverpool market forty-

four years since, that the average price of a good fair calving cow sold for so many pounds, which is the case at this present time. From the years 1795 and 1796, the average price of a good fair calving cow has been from £12. to £18. although, forty-four years since, there were what I call prime cows that sold at £3. and £4. per head above the average price, as well as now, when a prime cow will sell for £30. My remark on the rise of butter forty-four years since to the present time is, that the average rise has been nearly one farthing per year in the pound weight: and from the same period of time to the present, that butcher's meat has gradually risen half a farthing per year in the pound weight of 16 ounces. Forty-four years since butcher's meat sold in Liverpool market from 1*d.* to 1½*d.* and 2*d.* and 2½*d.* the best prime meat; now, the best prime meat sells at 8*d.* the average price through the year: and if you run the chance of the market for small quantities of the best prime meat of any kind, you must sometimes pay from 10*d.* to 1*s.* per pound. Cattle of all kinds, since the beginning of this year, 1804, are cheaper in price by two guineas per head, to their size and bone, than they have been these several years past, and have been gradually falling in price since the commencement of this present year. Pigs are one-third cheaper; pork may be bought from 5*d.* to 6*d.* per pound; but beef, mutton, and veal keep up their prices, particularly the best prime meat, although cattle are considerably lower in price.

John Joseph Atherton.

The rise in wages, in poor rates, and corn tithes being taken in kind, of course must have a great effect upon our agriculture. Wheat can never pay a farmer in this country under 10*s.* per bushel; the present price is about 7*s.* but the fluctuation of prices is the bane of every thing.

The custom of tithe here is, that the clergyman takes the eleventh sheaf; hay and clover in the same proportion, though generally compounded for.

LINCOLNSHIRE.

Expense of raising an Acre of Turnips.	1790. £.	s.	d.	1804. £.	s.	d.
RENT and taxes	0	16	6	1	8	9
Four ploughings	0	16	0	1	4	0
Three harrowings	0	3	0	0	4	6
Two rollings	0	1	0	0	2	0
Five loads of manure	1	5	0	1	17	6
Ditto, leading	0	7	0	0	10	6
Ditto, spreading	0	1	6	0	2	6
Hoeing, first and second time	0	7	0	0	9	6
Weeding	0	2	0	0	4	0
Sowing 4*d.* seed 1*s.*	0	1	4	0	1	6
	4	0	10	6	4	9
Barley.						
Rent and taxes	0	16	6	1	8	9
Two ploughings	0	8	0	0	12	0
Two harrowings	0	3	0	0	4	6
Two rollings	0	1	0	0	2	0
Seed	0	10	6	0	10	6
Sowing	0	0	4	0	0	6
Weeding	0	1	0	0	2	0
Tenting	0	0	6	0	0	9
Mowing	0	1	3	0	2	6
Making ready to load	0	4	0	0	7	0
Leading, stacking, and thatching	0	3	0	0	4	6
	£.2	9	1	3	15	0

Expense of an Acre of Wheat, after Seeds.	1790. £.	s.	d.	1804. £.	s.	d.
Rent and taxes	0	16	6	1	8	9
One ploughing	0	5	0	0	7	0
Seed	0	18	0	1	1	0
Sowing	0	0	4	0	0	6
Harrowing	0	2	0	0	3	0
Tenting	0	0	6	0	0	9
Weeding	0	0	6	0	1	0
Reaping	0	6	0	0	10	6
Leading, stacking, and thatching	0	2	6	0	3	9
	2	11	4	3	16	3
Wheat on Fallows; strong Clay.						
Rent and taxes for two years	1	5	0	1	15	0
Five ploughings	1	5	0	1	15	0
Harrowing	0	2	0	0	3	0
Manure, same as for turnips	1	14	0	2	10	6
Seed	0	18	0	1	1	0
Sowing	0	0	4	0	0	6
Gripping	0	0	6	0	1	0
Weeding	0	1	0	0	2	0
Tenting	0	0	6	0	0	9
Reaping	0	6	0	0	10	6
Leading, stacking, and thatching	0	2	6	0	3	9
	£.5	15	10	8	3	10

Threshing not included.

NORTHAMPTONSHIRE.

Mr. Nathaniel Cotton.

A six years system of farming 100 acres of good land, without impoverishing it, in six closes of 16 acres each; allowing 4 acres for home, yards, garden, orchard, &c. for convenient occupation.

No. of Years.	No. of Fields.					
	1st.	2d.	3d.	4th.	5th.	6th.
1st.	Wheat upon second year's seeds.	Part oats and part pulse.	Turnips.	Barley.	Seeds.	Seeds.
2d.	Part oats and part pulse.	Turnips.	Barley.	Seeds.	Seeds.	Wheat.
3d.	Turnips.	Barley.	Seeds.	Seeds.	Wheat.	Part oats and part pulse.
4th.	Barley.	Seeds.	Seeds.	Wheat.	Part oats and part pulse.	Turnips.
5th.	Seeds.	Seeds.	Wheat.	Part oats and part pulse.	Turnips.	Barley.
6th.	Seeds.	Wheat.	Part oats and part pulse.	Turnips.	Barley.	Seeds.

Acres.	Produce.	£.	s.	d.
16	Of wheat, upon land worth £1. 10s. per acre, three quarters per acre, at 6s. 6d. per bushel -	124	16	0
16	Of barley, seven quarters per acre, at £1. 10s. per quarter -	168	0	0
16	Of oats and pulse, supposing one-third of the crop to be consumed by the horses and pigs, the remainder valued at £4. per acre	64	0	0
16	Of turnips, at £4. per acre -	64	0	0
	Profits arising from sheep stock	50	0	0
	Ditto from beasts - -	20	0	0
	Ditto from pigs - -	10	0	0
		£.500	16	0

Expenses.	£	s.	d.
Rent - - -	150	0	0
Rates (poor, church, highway, &c.)	30	0	0
Assessed taxes - -	4	0	0
Tenants tax, of 9d. in the pound	5	12	6
One man servant, One boy -, One maid ditto — Wages per ann. (£. s.: 10 10; 5 5; 5 5)	21	0	0
Board of three servants, at one guinea per week - - -	54	12	0
One constant labourer, at 10s. per week - - -	26	0	0
Three harvest men for a month, at three guineas and a half each man	11	0	6
Five quarters of malt, at 8s. per bushel - - -	16	0	0
Wear, tear, blacksmith, wheeler, collar-maker, and carpenter -	35	0	0
Lime for the turnip land, 160 quarters - - -	22	0	0
Seed wheat, 3 bushels per acre, at 6s. 6d. - - -	15	12	0
Seed barley, 4 bushels, at 3s. 9d.	12	0	0
Seed oats, &c. 6 bushels at 2s. 6d.	12	0	0
Grass seeds, 1 pound per acre -	16	0	0
Turnip seed - - -	1	12	0
Interest of capital - -	35	0	0
No tithes, because the land here is tithe free.			
Sundries - - - -			
	£.467	9	0

This account I have obtained from a village between Thornby and Northampton, where the land is a loam and sandy, and easily cultivated. The expenses in 1790 not brought forwards, but the general difference about here is at least one-third; which, if deducted from £467. 9s. would leave what may be supposed to have been the expenses of 1790. This mode of farming 96 acres applies all round Northampton for a large tract; scarce an open field being left, except Naseby, in the western district.

NORTHUMBERLAND.

Mr. George Culley.

I AM convinced, that labour never advanced in any particular manner in this country in my time (who have now been a farmer more than fifty years), until the year 1795, which was the year when the first remarkable advance took place in grain. Indeed the rise in wages did not take place until the year after, viz. 1796; because every farmer of consequence in the year 1795, in this district, let his labourers have their corn at such reduced prices as they could afford to give. As a proof of the above, we find by our books that for a number of years prior to 1795, we paid no more than 1*s.* per day per annum for our labourers; and we generally agreed by the year with them. And if we hired any extra hands during the winter, we gave them until Candlemas no more than 8*d.* or 9*d.* per day, then 10*d.* until 12th of May, and 1*s.* the rest of the year; except in harvest or mowing time, we gave them 1*s.* and victuals, or 1*s.* 6*d.* without meat. Immediately after the year 1795 labourers wages advanced, and kept gradually advancing, although grain got down to reasonable prices, until 1801, when the second great advance on grain took place; since which time wages have doubled, or nearly so, to what they were prior to the year 1795! A woman shearer in 1794 was no more than 1*s.* per day; in 1803 they had 2*s.* and more in some places. A man in the harvest 1794 was 1*s.* 6*d.* without victuals, and 1*s.* with victuals; but the last year and the year before, viz. 1802 and 1803, 2*s.* and victuals. Much the same in masons, carpenters, &c. &c. From 1794 to this time their wages have doubled, or as nearly so as can be.

NOTTINGHAMSHIRE.

Mr. Christopher Morley.

IT appears very obvious that the expense of a corn farm is one-third more in the year 1804 than in the year 1790. My opinion is, that the farmer at this time labours under almost insurmountable difficulties, which requires the closest attention of the legislature. There has been petitions sent to parliament respecting the high duty upon malt; this complaint requires serious attention. It appears that the consumption of malt by the extra duty is not much decreased: the present process of making

malt, I think, is deficient, and requires an alteration. After the barley has been in the cistern a proper time, (not less than forty-eight hours) so that it may imbibe a sufficient quantity of water, it is then put into a frame for gauging, and when that process is over, and the duty ascertained, by protracting the process afterwards, is an injury to the revenue, and also to the malster. If the malt-maker (after the gauge is taken by the exciseman) had liberty to follow his own ideas in making the malt, there would be, most certainly, nearly one-third more malt made in the season than by the present protracted process, and it would be of a better quality; as some part of the malt, by the present restricted method, is obliged to be made in the heat of summer, which greatly injures it.

NORFOLK.

Rev. St. John Priest, Secretary to the Norfolk Agricultural Society.

EXPENSES of preparing and raising an acre of turnips, thus estimated:

	1790.			1804.		
	£.	s.	d.	£.	s.	d.
Four ploughings and harrowings	1	0	0	1	0	0
Muck, ten loads	1	5	0	1	5	0
Cartage of ditto	0	12	0	0	15	0
Filling and spreading the muck	0	2	6	0	3	4
Seed and sowing	0	1	0	0	1	0
Hoeing twice	0	6	0	0	7	6
Rent	0	16	0	1	5	0
Tithe	0	3	0	0	4	0
Town charges	0	3	0	0	6	0
	4	8	6	5	6	10
Barley as above, after Turnips.						
Three ploughings and harrowings	0	15	0	0	15	0
Seed	0	7	6	0	7	6
Rent, tithe, and town charges	1	2	0	1	15	0
Harvesting	0	7	6	0	9	0
Threshing	0	3	6	0	5	0
Carrying out to market	0	3	6	0	5	0
	2	9	0	3	16	6

Preparing and raising the Wheat upon Olland.

	1790. £.	s.	d.	1804. £.	s.	d.
Ploughing	0	6	0	0	7	6
Seed	0	10	6	0	12	6
Setting	0	9	0	0	10	0
Rent, tithe, and town charges	1	2	0	1	15	0
Harvesting	0	9	0	0	12	0
Threshing	0	7	0	0	9	0
Carrying out to market	0	5	0	0	6	0
	£.3	8	6	4	12	0

Mr. Thomas Thurtell.

I COULD grow wheat in 1790 at 40*s.* a quarter, with a greater profit to myself, than I can now at 60*s.* a quarter, and other grain in proportion.

*A Correspondent.**

Collar-maker's Work.	1790. £.	s.	d.	1804. £.	s.	d.
HARNESS, per horse	1	1	0	1	10	0
Plough halters	0	3	6	0	6	3
Collars	0	4	0	0	5	9
Waggon ropes, &c. per lb.	0	0	6	0	0	10
Curriers or dubbing oil, per gallon	0	3	4	0	5	8
White leather, per hide	0	16	0	1	8	0
Wheelwright's Work.						
A waggon	4	14	0	7	0	0
A new cart	2	12	6	3	15	0
A run of waggon wheels	4	4	0	6	0	0
Ditto cart wheels	2	10	0	3	15	0
A plough	0	6	0	0	8	6
A pair of plough wheels	0	10	6	0	16	0
A pair of strong harrows	0	10	6	0	15	0
——— light harrows	0	9	0	0	14	0
A pair of shafts, painted	0	12	6	0	17	0
An axletree	0	6	6	0	9	0
Rakes, per dozen	0	8	0	0	15	0
Fork shafts	0	6	0	0	8	0

* Name obliterated.

Mr. John Reeve.

One material circumstance is not inquired after, viz. the increase of assessed taxes. The establishment in 1790 I paid £26. 7*s.* for. I now pay £47. 4*s.* 6*d.* exclusive of the property tax.

SUFFOLK.

Mr. Thomas Simpson.

I must beg leave to state that the last duty upon malt, with the additional tax upon cart horses since 1790, amounts to 2*s.* per acre upon the arable land in this neighbourhood.

SUSSEX.

Rev. Nicholas Turner.

Preparing and raising a crop of turnips, or barley, or wheat, vary greatly in expense, according to the different modes of culture: of course no single statement would be explicit enough to draw any useful conclusions from it. A few observations, therefore, is necessary, which I am induced to make, hoping they may contain some information; at the same time, I am aware, it will require a very accurate practical knowledge to draw out such an account as will be a tolerable sure guide to the Corn Committee; for the several charges of any one crop should not all be placed to the account of that crop, oftentimes a whole course is benefited by the preparation for the first crop, and it is very difficult to apportion the expense according to the progressive aid such crop receives from the improvement. Indeed no profession or business depends so much on aggregation as that of a farmer; which will appear on considering that neither turnips (which no good husbandman, on certain soils, can farm without) ever pay their expenses; and that more than half the wheat crop in the kingdom, (the grain that is supposed to enable the farmer to pay his rent,) is in the same predicament, and verifies what an experienced farmer remarked, on my complaining of his charging 9*s.* per acre ploughing, that both parties would be ruined—I who hired, and himself who was hired; so true it is, that agricultural profits depend on aggregate produce, and that any statement of expense by hiring,

or the supposed expense to the farmer, will, in some measure, mislead the Corn Committee.—Let us see how the different statements will turn out on paper.

Turnips in 1790.	£.	s.	d.	*Turnips in* 1804.	£.	s.	d.
Rent	0	12	0		0	16	0
Four ploughings, at 6*s.*	1	4	0		1	12	0
Twice drag harrowing, Twice small harrowing, Twice rolling	0	16	0		1	0	0
Seed	0	1	0		0	1	0
Lime	2	5	0		3	0	0
Hoeing	0	5	0		0	6	0
Poor tax 5*s.* tithe 4*d.*	0	5	4		0	11	2¼
Total	5	8	4		7	6	2¼

The average price of turnips does not exceed £2. 10*s.*

	£.	s.	d.		£.	s.	d.
Expense on turnips in 1790, is	5	8	4	Expense on turnips in 1804, is	7	6	2¼
Average price	2	10	0	Average price	2	10	0
Loss in 1790	2	18	4	Loss in 1804	4	16	2¼

Barley in 1790, *after Turnips.*	£.	s.	d.	*Barley in* 1790, *fallowed for after Wheat.*	£.	s.	d.
Rent	0	12	0		0	12	0
Ploughing	0	6	0		0	18	0
Harrow and rolling	0	3	0		0	6	0
Seed, 4 bushels	0	13	0		0	13	0
Cutting and cocking	0	2	0		0	2	0
Harvesting	0	3	0		0	3	0
Threshing	0	7	6		0	7	6
Carriage out	0	5	0		0	5	0
Poor tax and tithe	0	5	4		0	5	4
Expense	2	16	10		3	11	10
Produce, 5 quarters, at 26*s.*	6	10	0	Produce, 4 quarters, at 26*s.*	5	4	0
Expense	2	16	10	Expense	3	11	10
	3	13	2				
Loss on turnips	2	18	4				
Gain on turnips and barley, only	0	14	10	Gain on fallowed barley	£.1	12	2

Barley after Turnips. 1804.	£.	s.	d.
Rent	0	15	0
Ploughing	0	8	0
Harrowing and rolling	0	4	0
Seed	0	13	0
Harvesting	0	6	0
Threshing	0	7	6
Carriage out	0	5	0
Poor tax and tithe	0	9	10
	3	8	4
Produce, 5 quarters, at 26*s.*	6	10	0
Expense	3	8	4
	3	1	8
Loss on turnips	2	18	4
Gain on turnips and barley is only	0	3	4

Barley, by fallowing after Wheat, in 1804.	£.	s.	d.
	0	15	0
	1	4	0
	0	10	0
	0	13	0
	0	6	0
	0	6	0
	0	5	0
	0	9	10
	4	8	10
Produce, 4 quarters, at 26*s.*	5	4	0
Expense	4	8	10
Profit on barley fallowed for after wheat amounts only to	0	15	2

Wheat, after Summer Fallow. 1790.	£.	s.	d.
Two years rent	1	4	0
Fallow, the same as in turnips	2	0	0
Lime	2	5	0
Seed	1	2	6
Reaping	0	9	0
Threshing	0	7	0
Harvesting	0	4	0
Carriage when sold	0	5	0
Poor tax and tithes, 9*s.* on 24*s.*	0	10	8
	£.8	7	2

Wheat, after Clover Ley. 1790.	£.	s.	d.
	0	12	0
	0	10	0
	2	5	0
	1	2	6
	0	9	0
	0	7	0
	0	4	0
	0	5	0
	0	10	8
	6	5	2

The average of wheat through the kingdom has been estimated at 22 bushels, at 6*s.* per bushel.

	£.	s.	d.
Expense of fallow	8	7	2
22 Bushels, at 6*s.*	6	12	0
Loss by wheat on summer fallow	£.1	15	2

	£.	s.	d.
Expense of clover ley	6	5	2
Produce	6	12	0
Profit by clover ley wheat amounts only to	£.0	6	10

Wheat, after Summer Fallow. 1804.	£.	s.	d.	*Wheat, on Clover Ley.* 1804.	£.	s.	d.
Rent	1	10	0		0	15	0
Ploughing, rolling, and harrowing	2	12	0		0	12	0
Lime	3	0	0		3	0	0
Seed	1	2	6		1	2	6
Reaping	0	10	0		0	10	0
Threshing	0	8	0		0	8	0
Harvesting	0	4	0		0	4	0
Carriage out	0	5	0		0	5	0
Tithe and poor rate, 14*s.* on £1. 10*s.*	1	1	0		0	10	6
	10	12	6		7	7	0
Produce	6	12	0		6	12	0
Loss	£.4	0	6		0	15	0

I believe the charges on the several crops are nearly correct, and (except the difference of rent), on reference to your worthy President, Lord Sheffield, he will concur, that they are the charges on fallowing in his neighbourhood, and through the Weald of Kent and Sussex, when any new tenant takes possession.

Trifling inaccuracies there may be, but I assert they are but trifling. What then are the conclusions that are to be drawn from them? It must follow, that the queries being only partial to such and such crops, are not comprehensive enough for the complex nature of farming business; and that the accounts, as here exhibited, shewing to the Committee, farming to be a losing trade in every point of view, must have the effect of misleading their judgment; which the general question of what are the profits of a farmer on the whole of his business, would not have done. At the same time, enough transpires by the accounts, to shew agriculture is at a very low ebb, from an increase of 30 per cent. on the farmer's expenditure, and the great decrease in the price of grain. Wheat and barley being the only sort of corn in the queries, it may not be improper to consider why they are so cheap: and first, of wheat, from the dryness of last summer, is supposed to be in great plenty; and old experienced farmers assert, that if this and next summer should be also dry, that wheat will not be more than £5. the load; so true is the old adage, A dry summer for Old England. Barley also last year yielded remarkably well; but the new duty on malt acts as a prohibition. There is no demand, notwithstanding so much barley has been used to fat oxen. The supervisor at Chichester reports, that more than one half the malt-houses in his district are shut up; indeed

it cannot be otherwise, when the duty is 36*s.* per quarter, or 150 per cent. on the present price of barley, 24*s.* the quarter. Malsters who wet 150 or 200 quarters of barley, bringing up a family of five or six children decently, have not a capital to continue the trade, the duty being paid every six weeks; and since the late regulation that no liquor should be put after it comes out of the cistern, there is now no increase, which was a source of considerable profit. Another cause (and I believe the greatest evil of all), that prevents the demand for barley, is the small quantity of malt used by the common brewers in proportion to the quantity of beer brewed; sugar, in some form or another, being substituted in its place. Formerly a heavy penalty attached to a brewer who had above ten pounds of molasses or sugar on his premises: that, I have heard, is done away, and some encouragement given by the Legislature to use sugar.

My malster informed me, he sold a carriage of malt to Horsham; on that day fortnight he went for his money; the dray coming with some empty casks, the brewer pointed to them, told him he had brewed his malt, carried it to Brighton, it was drank, and there were the casks. No beer brewed with malt and hops would have been fit to drink. Sugar was, probably, the chief ingredient. The late scarcity brought it into general use, and there are now brewers' chemists, (see a pamphlet written by one Childs on this subject,) where you may be supplied with colouring, (i. e. sugar boiled down to the consistence of pitch,) bitters, which is also sugar heated in a brass cauldron till red hot, heading, and many other articles: so that not above one bushel of malt in four is used for this liquor, which cannot be called beer, is very intoxicating, and therefore very hurtful to the health and morals of the lower class of people, nicknamed by them the nimble nine-pence; that is, they can get drunk for that sum, when with beer brewed with malt and hops their debauch will cost a shilling. I have one more observation to make, no better course of crops has hitherto been adopted, than turnips—barley—clover—wheat. It is so connected, that if one link fails it prejudices the whole course. The barley trade being abolished will naturally affect it. After turnips, sow half a field with barley, half with oats, the same day, the same culture; the clover sown with the barley will be better than if sown with oats, or other grain. Facts are stubborn things, and this is the fact. On the goodness of the clover crop depends, in a great measure, the succeeding wheat. Now, since the increased duty on malt, the lime kilns at Rudborough, near Petworth, formerly worked at Candlemas, for lime to

be laid on the barley ground, have not been used this spring for that purpose, there being no demand for lime.

Thus the wheat crop will ultimately be affected, that is, raised at the least expense* to the community.

WILTSHIRE.

Thomas Davis, Esq.

On the whole, I am of opinion, that the expence of raising corn now is full 25 per cent. more than it was in the year 1790.

Mr. Edward Green.

The expense of summer tilling our strong clay lands per acre is nearly as follows:

	£.	s.	d.
Ploughing four times, at 10*s.* each time - - -	2	0	0
Dragging twice, at 3*s.* - - - -	0	6	0
Harrowing and sowing - - - -	0	1	6
16 Cart loads of dung, and carriage, value 4*s* per load -	3	4	0
Seed 2 bushels, 9 gallons to the bushel, sowed broad cast, cost	0	17	0
Hand-hoeing twice - - - - -	0	8	0
Reaping - - - - - -	0	9	0
Two years rent (tithe free) - - - -	2	0	0

YORKSHIRE.

William Strickland, Esq.

With respect to the price of agricultural labour, I think it may be fairly stated to have doubled within the last fourteen years throughout this county. In the Eastern and Northern parts of this county the rate of increase exceeds double; in the Western part, where the population is greater, and less of agricultural labour is required, it is somewhat lower. I have known, in the East Riding, 3*s.* a day generally paid during the last winter to ordinary hands for threshing, and upwards of

* See the foregoing account of fallow by clover ley wheat.

2*s.* a day and their meat; and even at that excessive rate sufficiency of hands cannot be procured to do the business of the country, so completely is it drained of hands, though every means are taken of diminishing the labour of the farm, and works of distant advantage and of mere ornament are given up. Men this winter have received wages at that rate, who, fourteen years since, and consequently when they were abler than at this time, worked for 10*d.* a day and their meat, or 1*s.* 4*d.* a day without it.

With respect to the poor rates, they differ greatly according to local circumstances, but they cannot be stated at less than double what they were fourteen years since; in the manufacturing countries, I have heard, that they much exceed double at this time; in the agricultural parts of the country they generally amount to that rate: different degrees of good management in parishes will make them higher or lower, but they may be safely stated at that average. I refer not to what they were three or four years since; at that time they increased four or five-fold and upwards; in one instance that I know, ten-fold; in some places leaving little to the owners of the soil.

As to the rate of rent what can be stated must be, in a certain degree, conjectural, and depend upon the facts that come within a person's own knowledge; I think near one-half of the property of this county has had no general raisement within fourteen years, because where the tenancy is at will, as is almost universally the case here, a general raisement upon an estate does not take place nearly so often as once in fourteen years. Where raisements have taken place, I have known one as low as 5 per cent. and I know a large estate, which is still low let, that has increased about 75 per cent. within that time; but in general, estates are not raised at one time more than 30 per cent. and seldom less than 20 per cent. If, therefore, half the estates have not been raised beyond what has taken place on deaths, or unavoidable changes; and the remaining half may be said to have been raised 30 per cent. the average within the last fourteen years may amount to about 15 per cent.

If, then, the occupier of the soil pay double for his labour, double for his poor rates, 15 per cent. more rent, income tax, and assessed taxes, which were not paid fourteen years since; great sums for the levy of militiamen and the army of reserve, and a great tax for the support of their families; a great increase in the county

rates, which is the case in this county, and a great increase in the price of every thing he consumes; what situation must he be in when the main produce of his farm sells for less than it did fourteen years since. It is a fact, that two or three weeks since the best barley (and better never was seen) could not be sold at 18*s.* per quarter, by country measure, which is 10 per cent. larger than Winchester, and which consequently reduces it to little more than 16*s.* per quarter; though a small increase has since taken place, in consequence of the demands of seed-time; and there was, and still is, no demand for wheat at 5*s.* 6*d.* per bushel He must either be very soon ruined, or his rents must be very greatly reduced, and if they are reduced, the owner of the soil must be ruined instead of him, since he pays an enormous increase of personal taxes, and in most instances near double, and in some treble, for what he consumes; or the occupier of the ground will cease to grow what he is not likely to be paid for, and another scarcity must be the consequence. Already arrangements are made to grow less corn this year than the last, and much less the next. I am satisfied, Sir, that the above may not be perfectly accurately calculated, and state it only as an approximation; but, believing it not to be far wrong, it may afford matter for serious reflection.

Mr. G. Hardwick.

Turnips for 1790, *per Acre.*

	£.	s.	d.
Ploughing six times, at 5*s.* -	1	10	0
Harrowing five ditto, at 1*s.* 6*d.* -	0	7	6
Lime, 2 chaldrons, at 13*s.* 6d. -	1	7	0
Dung, 7 waggons, short, at 5*s.* -	1	15	0
Seed, 2 lb. at 6*d.* per lb. - -	0	1	0
	5	0	6
Hoeing, (little practised at this period here) - -	0	4	0
	£.5	4	6

Turnips for 1804, *per Acre.*

	£.	s.	d.
Ploughing six times, at 6*s.* -	1	16	0
Harrowing five times, at 2*s.* per acre	0	10	0
Lime, 2 chaldrons, at 14*s* 6*d.* -	1	9	0
7 waggons short dung, at 9*s.* -	3	3	0
Seed, 2 lb. at 1*s.* 3*d.* - -	0	2	6
	7	0	6
Hoeing is universally practised at present, once or twice -	0	6	0
	£.7	6	6

Wheat. 1790.	£.	s.	d.	*Wheat.* 1804.	£.	s.	d.
Ploughing five times	1	5	0	Ditto	1	10	0
Harrowing three times	0	4	6	Ditto	0	6	0
Lime, 3 chaldron	2	0	6	Ditto	2	3	6
Seed, 2 bushels	0	12	0	Ditto	0	12	0
Gripping, 1*s.* per acre	0	1	0	Ditto	0	1	6
	£.4	3	0		£.4	13	0

Mr. John Tuke.

Expenses of preparing and raising an Acre of Turnips at this Time.

	£.	s.	d.
Four ploughings, at 6*s.*	1	4	0
Dragging twice and harrowing three times	0	10	0
Picking and cleaning	0	5	0
Three doz. of lime, 36 bushels each	2	3	6
Ten tons of dung, at 10*s.* 6*d.*	5	5	0
Hoeing, twice	0	12	0
Seed and sowing	0	2	0
Rent and assessments	1	10	0
	11	11	6

A Crop of Barley after Turnips, one Acre.

	£.	s.	d.
Two ploughings	0	12	0
Seed and sowing	0	9	6
Two harrowings	0	3	0
Rent and assessments	1	10	0
	£.2	14	6

A Crop of Wheat on Summer Fallow, one Acre.

	£.	s.	d.
Four ploughings	1	4	0
Dragging and harrowings	0	10	0
Picking and cleaning	0	5	0
Lime	2	3	6
Dung, or other manure in lieu	4	4	0
Ploughing for seed furrow	0	6	0
Seed and sowing	1	4	0
Harrowing in seed	0	2	0
Two years rent and assessments	3	10	0
Weeding	0	2	0
	£.13	10	6

Right Honourable the Lord Hawke.

West Rid' } SS. At a General Quarter Sessions of the Peace held at Pontefract,
Com Ebor. } in the 5th of Geo. II. 1733, April 18.

A LIMITATION and appointment of the several wages of artificers, handicraftsmen, husbandmen, labourers, servants, and workmen, within the said West-Riding of the County of York, rated and agreed upon at the said Sessions by the Justices of the Peace, then and there assembled, the day and year above said, according to the tenor, form, and effect, of several Acts of Parliament, in that case made and provided, viz.

Artificers and Handicraftsmen.—A master mason, that taketh the charge of a building, having under him one or more men, that have been two years or upwards at the trade, shall take for wages for himself by the day, at any time of the year, with meat and drink, not above sixpence, and without meat and drink, not above one shilling; and for every one that worketh under him, with meat and drink, not above five-pence, and without meat and drink, not above ten-pence.

A man for making a rough dry stone wall, one yard and a half high, and half a yard thick, having stones laid by him, shall take by the rood, without meat and drink, not above one shilling.

A master carpenter, who taketh charge of a building, and hath one or more men under him who have been two years or upwards at the trade, shall take by

the day, without meat and drink, not above one shilling, and with meat and drink, not above sixpence.

A master millwright shall take for himself by the day, without meat and drink, not above one shilling and sixpence, and for his servant, without meat and drink, not above one shilling.

A master or other that hath but one man or none, and that doth not take charge of a building but of other work, as hewing, squaring, walling, or such like: a lime-burner, cooper, bricklayer, brickmaker, thatcher, slater and tyler, shall respectively take by the day with meat and drink, from the Annunciation of the Blessed Virgin Mary until Michaelmas, not above sixpence, and without meat and drink not above one shilling: and from Michaelmas to the Annunciation of the Blessed Virgin Mary, with meat and drink, not above four-pence, and without meat and drink, not above ten-pence.

A master taylor shall take by the day, with meat and drink, not above four-pence, and for his servant not above two-pence.

A graver of turfs or peats shall take by the day, with meat and drink, not above four-pence, and without meat and drink, not above eight-pence.

Labourers in Husbandry.—A man for ditching, paling, railing, thrashing, and other labourers work, from the feast of St. Martin to Candlemas day, shall take for wages by the day, with meat and drink, not above two-pence, and without meat and drink, not above sixpence; and from Candlemas day to the feast of St. Martin, with meat and drink, not above four-pence, and without meat and drink, not above eight-pence.

A man for casting or setting any ditch, one yard and a quarter broad, and a yard deep, having the quickwood ready laid beside him, shall take for a rood not above sixpence; and when the ditch is bigger or lesser, more or less after the same rate; and for securing a ditch three spades breadth and two deep, shall take for a rood not above two pence, and for staking or spade grip in breadth and depth for every rood not above one penny.

Labourers in Harvest work.—A mower of grass or corn shall take for wages by the day with meat and drink not above sixpence; without meat and drink, not above one shilling.

A shearer of corn shall take by the day, with meat and drink, not above six-pence, and without meat and drink not above one shilling.

A woman shearer of corn shall take, with meat and drink, not above four-pence, and without meat and drink, not above sixpence.

A haymaker, weeder, or lowker of corn shall take by the day, with meat and drink not above four-pence, and without meat and drink, not above eight-pence; a woman shall but take half as much.

None shall take for mowing an acre of meadows, statute measure, above one shilling.

Household Servants.—A bailiff, or footman of husbandry that is hired with a gentleman or yeoman that doth not labour himself, but putteth his whole charge to his servant, shall take for his wages, with meat, drink, and a livery, not above four pounds ten shillings, and without livery five pounds.

A chief servant in husbandry to a yeoman or husbandman, that can mow and sow and do other husbandry work well, shall take by the year, with meat and drink, not above three pounds ten shillings.

An ordinary servant in husbandry that can mow and plough well, shall take by the year, with meat and drink, not above two pounds five shillings.

A young man between the ages of 12 and 16 shall take by the year, with meat drink, not above one pound sixteen shillings and eight pence.

A milner that is skilful in mending his mill, shall take by the year, with meat and drink, not above four pounds, and one that is not so skilful, not above three pounds.

A woman servant that taketh charge of brewing, baking, and of the kitchen and milk-house, that is hired to a gentleman and yeoman (whose wife does not take that charge upon her), shall take by the year, with meat and drink, not above forty-shillings.

A woman servant that serveth an husbandman or farmer, or any other woman servant, shall take by the year, with meat and drink, not above one pound ten shillings.

A maid servant under the age of sixteen years shall take by the year not above twenty shillings.

Colliers.—A collier or workman that is skilful in getting coals, shall take for his wages by the day, without meat and drink, not above one shilling.

A filler or barrower of coals by the day, with meat and drink, not above ten-pence.

A banksman or drawer up of coals shall take by the day, with meat and drink, not above eight-pence.

It is ordered, that the justices of the peace of this Riding, at their monthly meeting, twice in the year at least, require the petty constables to give an account what number and sort of men and women servants each inhabitant within his constablery hath, and what wages every master gives to every particular servant.

That one or more of the next justices of the peace be present at every statute or petty sessions, and that the bailiff of every hundred and their deputies, together with the chief constable and the petty constables be summoned to give their attendance at the said petty sessions; and that the said sessions be kept only in the month of October next, upon such days as the justices of the peace of the division shall appoint.

And to the end that masters and servants may not be ignorant of the law, they may take notice, that it is enacted by the 5th of Eliz. C. 4, That no person who shall retain any servant, shall put away his or her servant before the end of his or her term, without reasonable and sufficient cause to be allowed before some justice of the peace of the county or place, nor at the end of his or her term, without one quarter's warning given before the said end, (to be proved by two witnesses,) in pain of forty shillings.

That if any person shall by any secret ways or means, directly or indirectly, retain or keep any servant, workman, or labourer, or give greater wages than are hereby appointed, he shall suffer imprisonment for the space of ten days, without bail, and forfeit five pounds.

That no servant lawfully retained shall part from his master, or mistress, or dame's service, before the end of his or her term, without reasonable or sufficient cause to allowed as aforesaid, nor at the end of his or her term, without one quarter's warning before the said end, in the presence of two lawful witnesses, in pain of imprisonment without bail.

That if any person betwixt the age of 12 and 60 years, liable to be retained by the said statute, and not retained, shall, upon request made, refuse to serve for the wages hereby set in husbandry, or in arts or mysteries set by the said statute, or promise or covenant to serve, and do not serve according to the tenor of the same, such person so offending shall suffer imprisonment without bail, till he shall be bound to the party to whom the offence shall be made, to serve and continue with him for the wages hereby set.

That if any person shall be retained, and take greater wages than are hereby set, he shall suffer imprisonment for one-and-twenty days, without bail.

That no artificer or labourer that shall be lawfully retained in or for the building of any house, or any other work taken by the great, shall leave the same before it is quite finished, except for non-payment of wages, the king's service, or any other lawful cause, or without license of the master, or owner of the work, or of them that have the charge thereof, in pain of one month's imprisonment without bail, and to forfeit to the party grieved five pounds, besides his costs and charges at common law.

That no servant shall, after the time of his retainer expired, depart out of the county, wapontake, city, town, or parish, to serve in another, without a testimonial under the seals of the constable, and two honest householders, where he was last hired, nor be retained without shewing such a testimonial, under pain of imprisonment till he produce such testimonial: and that no master shall retain a servant without such a testimonial, in pain of five pounds; which said testimonial is directed by the said statute to be written and delivered to the said servant, and to be registered by the parson, vicar, or curate of the parish, where such master, mistress, or dame, doth or shall dwell, taking for the doing thereof two-pence, and not above, and the form thereof to be as followeth, viz.

West Rid' } SS.
Com' Ebor' }

Memorandum. That A. B. servant to C. G. of E, in the said Riding, husbandman, (or taylor, &c. as the case may be,) is licensed to depart from his master, and is at liberty to serve elsewhere, according to the statute in that case made and provided. In witness whereof, we, who are inhabitants of the said town of E, have hereunto set our seals, the 22d day of November, Anno Domini 1733.

And lastly, it is ordered by this court, that a copy thereof be sent to every township within this Riding, and that the same be published in every market town, at the market-cross, between the hours of twelve and one, upon some market day before Michaelmas next, by the bailiffs of the respective wapontakes: and also that the petty constables go to every particular family within their respective constableries, and declare the contents of this order and rates of wages, and after fix the same upon church, or chapel doors, or in some other public place within their respective townships, the Sunday before the statute or petty sessions.

Per Cur'

Wm. Wickham, Cler' Pacis.

Mr. G. Addinell.

Expenses for preparing and raising an Acre of Turnips.	1804. £.	s.	d.	1790. £.	s.	d.
To one year's rent	1	2	0	0	12	0
To tithe and taxes	0	12	0	0	7	0
To one ploughing in October	0	7	0	0	5	0
To one cross ploughing in February	0	7	0	0	5	0
To once dragging and once harrowing over, to pulverize it, in March	0	2	0	0	1	6
To two women, one day each, collecting and gathering root weeds, at 8*d.*	0	1	4	0	1	0
To one ploughing, with two women gathering root weeds in the furrows	0	8	4	0	6	0
To harrowing in April, and collecting root weeds, two women, one day each	0	2	4	0	1	9
To one ploughing in May, with two women collecting weeds in the furrows	0	8	4	0	6	0
To ten loads of manure, at 7*s.* per cart load	3	10	0	1	10	0
To ditto, carting and spreading manure, at 3*s.* per load	1	10	0	1	0	0
To ploughing, sowing, and twice harrowing, in June	0	8	6	0	6	6
To 2 lb. of seed, at 1*s.* per lb.	0	2	0	0	1	4
To hoeing, three times over	0	10	6	0	8	0
	£.9	11	4	5	11	1

Barley is always sown after turnips, on one ploughing, and succeeded by red clover for mowing, and wheat after red clover, on one ploughing.

The next rotation is turnips, barley on one ploughing, two years grass-seeds for sheep pastures, wheat on one ploughing, and followed by oats, tares, or peas, on one ploughing; which seldom fail of a crop.

The next rotation is turnips, barley, beans, drilled on one ploughing, and hoed twice over; and, previous to the last hoeing, about two quarts of rape or cole-seed is sown on an acre, which never injures the beans; but is a fine pasture for sheep after the beans are cut and carried, and is an excellent preparation for a crop of wheat after the beans, which is always sown on one ploughing.

This method of preparing land, and the above rotation of cropping, are generally practised in the neighbourhood of Tadcaster by all good farmers.

Thomas Yorke, Esq.

It is remarkable, that the constables' charges and poor rates together amounted only to £3. 14*s.* 1 1½*d.* in the township of Halton West, from whence this paper is sent, in the year 1732; that these rates amounted to £43. 18*s.* 1*d.* in the year 1768; during which period very little advance of rent, and no alteration of management took place: that in the year 1790 the same rates amounted to £63. 16*s.* 8½*d.* and it is supposed that the rates this year will amount to more than £170. Since the year 1768 a considerable advance of rent and alteration of management have taken place; yet it does not appear that this great increase of rates can in any great degree be ascribed to these circumstances. Most of those who now receive relief, date their settlements from times which are prior to the year 1768.

The Expense of raising a Crop of Turnips may be thus estimated per Acre.

	1790.			1804.		
	£.	*s.*	*d.*	£.	*s.*	*d.*
Two ploughings with three horses	0	12	0	0	16	6
Three ploughings with two horses, without a driver	0	11	0	0	15	6
One harrowing with a great harrow	0	2	2	0	3	2
Four ditto with small harrows	0	5	0	0	7	4
Seed	0	1	0	0	1	6
Twenty loads of lime	0	17	4	1	0	8
Hoeing twice	0	7	6	0	9	0
For gathering quickens by hand	0	10	0	0	12	0
For leading and spreading manure	0	8	0	0	10	6
	£.3	14	0	4	16	2

Dung is not usually bought here, and the farmers rest contented with their own produce; and I have not kept any account of the expense of making and turning over compost, and therefore have omitted it.

The Expense of raising a Crop of Barley, per Acre.	1790. £.	s.	d.	1804. £.	s.	d.
Two ploughings with two horses, without a driver -	0	7	4	0	10	3
Two harrowings with small harrows - -	0	2	6	0	3	8
Three bushels of seed - - - -	0	10	0	0	11	0
£.	0	19	10	1	4	11

The Expense of raising a Crop of Wheat may be thus estimated.	1790. £.	s.	d.	1804. £.	s.	d.
Two ploughings with three horses - -	0	12	0	0	16	6
Three ploughings, without a driver - -	0	11	0	0	15	6
One harrowing, with a great harrow - -	0	2	2	0	3	2
Four ditto, with small harrows - - -	0	5	0	0	7	4
For gathering quickens by hand - -	0	10	0	0	12	0
Thirty horse loads of lime - - -	1	6	0	1	11	0
Three bushels of seed - - -	1	1	0	1	4	0
£.	4	7	2	5	9	6

I have allowed five ploughings for wheat, but in many cases four are amply sufficient.

GLAMORGANSHIRE.

J. Franklin, Esq.

I THINK leases and a commutation for tithe, with a good purse, essential to good farming; and that the present high price of horses, cattle, sheep, butter, and cheese, is owing to the additional quantity of land ploughed when corn was very dear; but as the price of corn is now so low as not to yield profit, on account of the increase of taxes and price of labour, the probable consequence will be a decrease of tillage, and a consequent high price of corn.

To encourage population and a permanent supply of all the necessaries of life, I conceive, that the most effectual means will be to empower all tenants for life to grant leases for a moderate term; to establish a fair commutation for tithe corn,

and to pass a general inclosure bill, without the great expense of separate acts; especially in cases where the commons in one manor or lordship do not exceed a certain quantity, suppose 1000 acres; at present there is near one-fourth of this county uninclosed and uncultivated, full of furze, heath, ling, gorse, and bogs, so as to starve and destroy a great part of the stock turned on them.

P. S. I am this year under an absolute necessity of laying down with grass seeds one-third of my arable land, for want of men to plough my land, and harvest and thresh my corn; which I cannot procure at double the usual price, and, if obtainable, the expense and taxes would occasion a loss, at the present low price and slow sale of corn; and I think this will be the case with many others.

PEMBROKESHIRE.

Charles Hassall, Esq.

An evil of the most serious magnitude has for some time, and still is, in progress, which, I trust, the wisdom of the Legislature will, by timely and effective measures, prevent from growing up to that state of calamitous inconvenience which, I fear, there is too much reason at present to apprehend. I mean, Sir, the great diminution in the culture of barley, which is now too generally taking place, in consequence of the very extraordinary duty laid upon malt last year. That measure disabled many capital malsters (and deterred many others) from making their usual quantity of malt; by requiring the use of a much greater capital than they usually employed in their trade. It has opened a tempting door to the smuggler, which, I apprehend, it will be extremely difficult for the Board of Excise effectually to shut.

Very many farmers have malting conveniences, by means whereof they can malt not only their own growth, but much more—they can *run* floorings of malt with scarce any chance of detection; and it is a fact, that this is done to a very great extent. I am well assured, that malt can *be bought* in distant counties and *carried to Bristol*, on cheaper terms *than it can be made there.*

The farmer who has not malting conveniences is obliged to sell his barley to those who have, on such terms as will not repay him the expence of raising it; and thence arises the great evil alluded to, namely, that all the occupiers of lands heretofore kept in tillage, which are of a loamy quality, and fit for either corn or grass, at the option of the farmer, are laying down a considerable portion of such

lands under grass-seeds; and consequently diminishing, to an alarming degree, the corn produce of the kingdom. It may be said, by way of argument, the less barley the more wheat; not so. Barley is the only crop that can be sown after turnips, which are fed off in the spring of the year; the diminution of barley is therefore, in effect, a diminution of turnips, which precede it, and of clover and wheat, which follow it. In fact, the present rage for laying lands down under grass, deranges the turnip system; the best system that ever was introduced into this country, and the parent of its present exalted and envied husbandry.

If some speedy remedy be not applied to stop what is now going forward to discourage the growth of barley, I fear I am too well warranted in thinking that we shall soon experience a recurrence of the calamities which so severely afflicted these kingdoms in 1799 and 1800; and which it cost government such immense sums in endeavouring (though too late in their application) to relieve.

I shall beg leave to mention one circumstance which gives the smuggler a decided advantage over the fair malster, as to the quality of his malt. The excise-officers will not allow the malster to sprinkle or moisten his malt in the flooring state, by which a considerable portion of the barley does not become fairly and sufficiently malted; and thereby the whole mass of malt is of weaker quality than it would be if the malster was not so restricted. The smuggler, on the contrary, feels no such constraint; his malt is better, it makes better beer, and consequently obtains a preference. I have no conception that the revenue could be injured if the Excise Board would direct their officers to allow the malster to sprinkle his floorings. In truth, it would eventually benefit the revenue, by enabling the fair trader to make and vend (at least) as good malt as the smuggler, and would, in some degree, lessen the motives for purchasing smuggled malt.

Another circumstance (for which I fear no immediate remedy can be devised) operates against the growers of barley in Britain, viz. the bounty of 16 per cent. ad valorem allowed in Ireland upon all spirits drawn from stills of a certain size. This bounty in favour of the Irish distiller enables him to undersell the Englishman in the British market; and it is pretended that no remedy can be applied to this partial evil, without infringing the *Act of Union.*

I hope and trust, however, that some effectual method will be devised by the wise deliberations of the Honourable Committee, now sitting, to support the drooping agriculture of the country; otherwise one or two scanty seasons and defective

harvests, will (whenever they happen) reduce us to a state of most serious necessity in the most essential articles of our maintenance.

EAST LOTHIAN.

EXPENSE of a plough for one year, supposing 50 acres to be the extent of one ploughgale of land, 30 acres of which are in grain, 10 acres in fallow and turnips, and 10 acres in grass:

1790.	£.	s.	d.
Rent, at 30s.	75	0	0
Interest on capital stock, say £150. per plough	7	10	0
Allowance for tear and wear on horses, 12½ per cent. on £40.	5	0	0
Smith, wright, and saddler	3	10	0
Ploughman	18	0	0
Labourers, per plough	4	0	0
Harvest work and board, per plough	15	0	0
Road work	1	0	0
Horse tax	0	0	0
Property tax	0	0	0
Window lights, per plough	0	5	0
Incidental work, per ditto	5	0	0
	£.134	5	0

1804.	£.	s.	d.
Rent, at £60.	150	0	0
Interest on capital stock, £200.	10	0	0
Allowance for tear and wear on horses, say on £60.	7	10	0
Smith, wright, &c.	6	0	0
Ploughman	25	0	0
Labourers, per plough	6	0	0
Harvest work	25	0	0
Road work	1	10	0
Horse tax	1	5	0
Property tax	3	15	0
Window lights	0	10	0
Incidental work	7	10	0
	244	0	0

From the above it appears, that the rent and expense of cultivating each ploughgale of arable land in 1804, exceeds those of 1790 in no less a sum than £109. 15s. without taking into account the increased expense of lime, dung, repairs of houses and fences, the private expenses of the farmer, and the maintenance of his family; and as nearly the whole outlays, rent excepted, falls on the produce of the 30 acres in grain, it also appears, after deducting £30. additional rent upon the acres not in crop, that the extra charge upon each acre carrying corn, amounts to £2. 13s. or thereabout. If we shall suppose that the disposeable produce amounts, on an average, to five bolls and one half from each acre, after seed and horse corn are deducted, then every boll of disposeable grain costs the tenant 10s. 1d. more than it did in 1790.

SCOTLAND.*

THE expense of preparing an acre of land for either wheat, barley, or neeps, must depend on the state of the ground and local situation; for instance, poor land requires a greater quantity of manure, and the carriage to ground at a distance from it, is great. But the same quantity of dung, suppose one ton, in 1790 cost 1*s.* 6*d.* here, it now costs 5*s.* and sometimes more.

The quantity of lime that cost in 1790 8*s.* 9*d.* now is 13*s.* 6*d.*

A mounted plough now costs £3. 10*s.*

A cart, with iron axle, for one horse, costs £12. to £12. 12*s.*

This place being near the great works of Carron, and in the centre of several large collieries, labour has for a long time been high. The charge of preparing one acre, Scots measure, for wheat, at one mile distance from this town, will astonish every one but a practical farmer. A note of preparing an acre, in but a moderate way, is below stated:

	£.	s.	d.
Two years rent, allowing the land to be fallowed -	6	0	0
Interest for one year's rent - - -	0	3	0
Fifty carts of dung, drawn by one horse, at 5*s.* -	12	10	0
Carriage of ditto, at 18*d.* - - -	3	15	0
Five chaldrons of lime, at 13*s.* 6*d.* - -	3	17	6
Carriage of ditto - - - -	1	0	0
Five ploughings and harrowings, at 12*s.* - -	3	0	0
Spreading lime and dung - - -	0	6	8
Spade work in cleaning furrows, &c. - -	0	1	8
	£.30	13	10

N. B. The quantity of lime is too small, notwithstanding the expense of preparing one acre for wheat is £30. 13*s.* 10*d.* besides seed and public taxes. And to do it for barley would be the same, except one year's rent, as they could be sown without fallow.

* County and name wanting.

LOTHIAN.

Benjamin Bell, Esq. of Edinburgh.

Such is the spirit with which agricultural improvements are going forward in every part of Scotland, (chiefly, as there is reason to believe, from farmers having no tithes to pay, and scarcely any poor rates,) that lime is frequently carried *by land*, as a manure, to *more* than twenty-five miles distance; chiefly owing (in my opinion) to the circumstances that I have stated, viz. the expense being low for supporting the poor, and no tithes being exigible in Scotland, every kind of improvement that is immediately necessary for the raising of crops is carried on with great accuracy and spirit; but, from the surprising increase of the price of labour that has taken place within these last few years, none but those who are highly opulent can attempt any expensive improvement, that is not essentially and immediately requisite. There is reason even to fear that the inclosing of grounds will proceed slowly, for it does not appear how the small and uncertain profits of agriculture can pay for the heavy increased expense that has so recently taken place in the conducting of this and every farming operation. I think, indeed, that in the distant rides which I have frequently occasion to take, not in Scotland only, but in England also, that the effect of this unfortunate occurrence shews itself evidently already. It seems, accordingly, to be an object well meriting the most serious attention of the Board of Agriculture, to devise and encourage plans for lessening the expense of labour; otherwise, it is not difficult to predict, that all important improvements in agriculture must soon be at a stand.

With sufficiency of funds, every thing that can be desired might be done; and if these cannot be obtained, it seems almost vain to make any attempt. By means of a moderate national expenditure, properly applied in the distribution of premiums, as well as in various other ways, the greatest benefit would accrue to the country; while nothing can with such certainty avert the calamity that we shall most unquestionably suffer from a scarcity of corn, on the very first recurrence of a deficient crop; for, however abundantly our markets are supplied at present, our quantity on hand is far from being sufficient to prevent an immediate and great rise of prices on any deficiency taking place. If government were again in a settled state, would there be any impropriety in the Board of Agriculture laying its views on this important national object before it, in a memorial, requesting parliamentary assistance?

SELKIRK.

Robert Douglas, Esq.

THE expense of raising an acre of turnips in 1790, stood nearly as under:

	£.	s.	d.
Three, four, or five ploughings preparing the ground according to its degree of foulness, stiffness, &c. take the medium of 4, at 4*s.* 6*d.* each	0	18	0
To 24 single carts of dung at 1*s.* 8*d.* each	2	0	0
To 2 horses, 3 men, and 2 women, filling, leading, spreading, and covering it, two days each horse, at 3*s.* 4*d.*; each man at 1*s.* and each woman at 8*d.* per day	1	15	4
Seed 9*d.* four hoers to clean it a first time, at 8*d.* each, and two ditto to hoe it a second time	0	4	9
Taking away the earth once, and replacing it	0	6	8
£.	5	4	9

In 1804.

The first ploughing would cost 7*s.* 6*d.* and each of the other ones 6*s.*	1	5	6
24 carts of dung, at 2*s* 6*d.*	3	0	0
4 Horses, each at 5*s.* 3 men, each at 1*s.* 10*d.* 2 women, each at 10*d.* two days	2	14	4
Seed 1*s.* 6*d.* four hoers, at 10*d.* 3*s.* 4*d.* two ditto at 10*d.* 1*s.* 8*d.*	0	6	6
Taking away, and replacing the earth	0	10	0
£.	7	16	4

But it ought to be observed that in 1804, the ground is much cleaner, and easier dressed, much richer and requiring less dung, and that, consequently, upon a farm having 40, 50, or 60 acres of turnips, more ground will be ploughed, dunged, and hoed, with the same horses and hands, and in the same time, than in 1790; and there will be a saving of 6 carts of dung, at 2*s.* 6*d.* 15*s.*; and about 1*s.* 5*d.* of the expense of labour, or nearly £1. 2*s.*; besides less expense and trouble in gathering, and burning, or carrying off weeds before dunging and sowing, which will always decrease as good husbandry advances.

Little or no wheat is sown here, and barley always with one ploughing after turnips, so that the expense per acre, of raising it, including seed, will be from 18*s.* to 21*s.* when it sells from 25*s.* to 30*s.* per quarter. There is less alteration in this expense, since 1790, than in any other article. Oats are the staple produce of the county, and sown after pasture, clover, hay, and of late after turnips. On lands brought into regular cultivation, the expense of raising an acre will be much the same as of barley; for though the seed be a little cheaper, the ploughing requires more time, except after turnips. The difference between raising an acre now and in 1790 will be about 1*s.* 5*d.* owing to the rise of wages, and of labour. New ground cannot be broken up, cleared of stones, dressed into ridges, manured with marl or lime and sown, under £5. per acre, in many situations not under £10. and at every intermediate cost, according to local circumstances.

The most extraordinary advance is upon servant-maids wages, from 45*s.* from Whitsunday to Martinmas in 1790, to £4. 15*s.* and even £5. in 1804.

MEARNS.

Mr. Robert Hay.

You will see by comparing the money columns, that the present price of the difference of labour is 93 per cent. higher (including the rise in rent) than it was in 1790; and in looking into the price of the different species of grain, I find that it is only about 7 per cent. higher now than then. From that statement, your Lordship will be apt to conclude that the farmers must be losing money, when it appears the balance is 86 per cent. against them in that period; but I am happy to say it is not the case. Notwithstanding the expense of labour and rise of rent, the additional taxes on account of the war, &c. &c. the farmers are at this time in general more able to pay the additional expense of labour, taxes, &c. &c. than they were at the former period.

As what is above stated must at first sight appear contradictory to reason, I beg leave to state to your Lordship the five following causes, which will make the argument consistent with itself:

1st. Though this district of Scotland, I have taken under my view (which contains, Lanarkshire, Airshire, Renfrewshire, Dumbartonshire, and Stirlingshire,) cannot be called a breeding district, yet I am certain that, except one-fourth which

is brought from the Highlands in the north, there is cattle reared for the internal consumption, notwithstanding the great consumption of Glasgow market; which consumes annually nearly as follows:

Bullocks, cows, and heifers -	7538
Veals - - - -	6740
Sheep - - - -	27316
Lambs - - - -	29621
Hogs, or swine - - -	329
	71544

The prices of all these, hogs excepted, is upwards of 150 per cent. higher now than at the former period.

2d. Not more than the one-fourth of the ground in this district is under tillage; and the produce of the dairy has advanced rather more than 110 per cent. It is a moderate calculation to say, that the farmer will draw from the produce of each cow he keeps, twelve pounds sterling annually.

The following account I received from a gentleman in my neighbourhood, which I can rely upon being correct, though I am convinced it is above the average of the district: he had twelve cows, and last year he sold as follows, besides supporting his family and servants:

	£.	s.	d.
Butter 108 stones of 16lb. and 22½ oz. each lb. sold per stone, at 23*s.*	124	4	0
Butter-milk 13392 Scotch pints, sold at 1*d.* per pint -	55	16	0
Veals, had they been all sold new dropped, at 10*s.* -	6	0	0
Net produce of 12 cows in 1803, besides supporting family, -	186	0	0

3d. From the improvement of all kinds of utensils, and other machinery used by the farmer, the same quantity of work is performed with a less number both of men and horses just now, than at the former period referred to in this letter. For instance, at the former period it was the custom to use four horses in drawing the plough; a few instances three; a singular circumstance two, with a driver to each plough; at this time the case is so much reversed, that it is as singular now to see four, as it was then to see two; and the number with three has much decreased; and few instances where any ploughman has a driver; and the work is now performed in a much superior manner. What has stimulated that respectable class of

the community, to advance rapidly towards perfection in their work is—in every district of the country there is a Farmer's Society established; and they meet at stated times to discuss all questions of importance respecting improvements. Each society sets a day apart annually (generally in February or March) for what we call a ploughing match, when their servants meet on a field formerly appointed, with their ploughs. A few prizes are distributed to the best performers. I was a spectator on one of these fields in March last, when twenty-five of these two-horse ploughs started for the prizes, and I never saw work executed to the same perfection. There were four prizes to be given; and it was with the greatest difficulty the judges were able to say who was most intitled.

The dimensions of the furrows $5\frac{1}{2}$ inches deep, and from nine to ten broad.

4th. From the improvement in the breed of horses, of making their harness, and of the wheel-carriages, horses are able to perform much more labour. In the west of Scotland we use only one horse for each cart, a singular circumstance two; and the farmer's load of lime and other manures, varies from 15 cwt. to one ton; and in Glasgow and its vicinity much more. It is the lowest calculation to say, that the carters in and about Glasgow, who make it their daily work to drive grain, wood, &c. &c. is 30 cwt. per one-horse cart. Even in going to Paisley, a distance of 8 miles, while the carriage itself would not weigh more than 8 cwt. You are certainly behind in your construction of carriages in England. I have seen three fine horses in Yorkshire drawing an unwieldy machine of perhaps 25 cwt. with stubble from the field in winter to the stable yard, and I am convinced the load itself would not have weighed one half the machine in which it was conveyed: even in London, from the observations I was able to make, I am convinced that the waggons in general would weigh nearly the one half of their load. The weight of those machines must be a very great drawback up hill, or when the roads are bad.

5th. From the improvement in ploughing, draining, and manuring, the land in general produces much better now than at the former period; and I believe the farmer that had 50 acres in tillage fourteen years ago, will have a greater quantity of grain now from 30, which reserves 20 for grass, with the whole expense of the labour, &c. of the 20 without the saving upon the 30.

But although what I have advanced is strictly true, and consistent with my knowledge, with regard to this district I have had the honour to report, yet it will

not hold with regard to Scotland in general. The east and north-east counties, (the produce of which is chiefly grain,) though the rise of land, and the expense of labour has not risen in so rapid proportion, and from the best information I have been able to obtain is as follows:

Rise on rent in 14 years last past -	80 per cent.
Ditto ditto manures -	100 ditto.
Ditto on wages and other expenses -	66⅔.

Yet from their produce being chiefly grain, and the rise upon it being so little, I believe that proportion bears heavier upon them, than the greater does upon their western neighbours. They complain loudly (and I believe with great justice) of the unequal proportion of the malt duty, for the quality of our barley is so much inferior to the English, that it will not afford the duty; and enable the maltster to give such a price as to induce the farmer to raise that valuable crop; and I am sorry to say, that unless some relief is given, the farmer will be obliged to abandon the raising of it; even when it is found to give the same weight as English barley, which is seldom the case, it does not give near the quantity of saccharine substance which is produced from the English.

From the annexment to the latter end, your Lordship will observe, that the poors rates bear very light upon the inhabitants of this country: the following is a statement of the poors-house in Glasgow, and means of support, as it stood the last week in March last.

In the charity-house, - -	400 persons.
Children, and frail people at nurse -	393
Families receiving support, - -	435

The expense of this charity last year was £4,663. 13*s.* 7*d.* The fund for defraying the above institution is raised by an assessment upon the moneyed interest within the royalty of the city; and the assessment varies as the need requires. No person is assessed, unless his property amounts to £300. The assessment last year was 2*s.* 2*d.* per £100. upon £4,015,400, which was rather short of that expended.

There are a great number of poor in the city of Glasgow, besides those supported by this Institution; but they are chiefly supported by collections at the church doors upon the Sundays; and when that fails to support them, publick collections are raised likewise at the church doors upon the Sundays; the minister, the preceding day to those public collections, making mention to the congregation

of the poor's funds being short; and upon such days, it is nothing uncommon to raise £70. or upwards; that, with donations conferred from charitable people, supports the poor in a more comfortable manner than they are in many other places.

The infirmary of Glasgow is another most valuable institution. It was erected about fourteen years ago by subscriptions, and many donations from moneyed people who wish well to mankind.

The subscription was general through Scotland, and there were few instances (at least upon the west) but each parish subscribed £50. sterling, which intitles the minister, in all time coming, to recommend two patients; and many hundreds receive relief, who can claim no right but that of humanity.

In the country our poors rates are still lighter. The Mains parish, where I reside, contains 1745 souls; of these, there are at this time 16 supported by charity, collected at the church door. I do not recollect that we were ever called upon for an extraordinary collection: and it is not consistent with my knowledge, that any individual goes out to ask supply.

Although I have rated the minister's stipend at 4*d*. per acre, in the money column of the letter returned, I have done it merely to show the small proportion he receives (that being nearly in the proportion of the acres which the parish contains). But, thank God, we know nothing about tithes in Scotland; and my opinion is, if that most destructive barrier to all agricultural improvements were done away in England, the happy time would soon arrive when she would be sending her agricultural produce for the supply of many of her poorer neighbours.

It is true, the ancient laws of Scotland has provided the $\frac{1}{5}$ of the free rental for the support of the clergy. But the land in general was valued long ago, when land was so very low; and in many instances is barely sufficient for their support. And when the valuation runs high, I believe the laws of equity would overbalance what they call their ancient right. It may be justly stated, that the clergy of Scotland do not receive more than £200. per annum; as many less as more.

If any district has not been valued formerly, the proprietor may call upon the *Lord of Teens*, and have it done before any agricultural improvement takes place. And if he should afterwards make his land one hundred times more valuable, no new valuation can take place.

The rental of the city of Glasgow (exclusive of those below £3. and which pay

no town's dues) is £108,970. the assessment for lighting the city, &c. &c. amount to $6\frac{1}{4}d.$ per pound, as stated in the annexment. There is no other burthens on the inhabitants that I know of, but what is collected for government.

I have been solicited by a gentleman in Airshire, with whom I correspond, to state to your Lordship the following improvement of waste land, by a poor, but ingenious old man, G. Kinnaird.

This gentleman told me that he had two acres attached to his farm, of a peaty substance; and though it lay with a considerable declivity, was so soft at bottom that he thought it prudent to inclose it off his farm, for endangering his cows in going into it.

The person above named, who had a strong propensity to try his skill in improving, applied to him for the said two acres. It was given him rent free.

From some heath covered knolls he built a small hut, and covered it with the heath, in which he took up his residence. He then laid off his field into ridges of five yards broad, conducted them on a level till he could obtain a fall of six inches, and then gave them the fall perpendicular. He collected a quantity of the clearing of the roads, in which he mixed a small quantity of lime and dung, and laid all on as a manure.

From laying down his little field as above, he was able to keep it nearly equal in moisture, by throwing in a turf at these breaks, when drought prevailed, and removing them when it was wet: and he believes from that mode of procedure he has to impute his great success. He has raised wheat, barley, oats, rutabaga, common turnip, all to great perfection; and the gentleman told me, that he looked upon his crop last year to be worth £10. per acre.

HADDINGTONSHIRE.

George Buchan Hepburn, Esq.

Husbandry day-labourers in Haddingtonshire are generally married men; they have a cottage and a garden, the thirty-second part of an acre, two cart load of coals drove, they paying the prime cost at the hill; the rent of the house, is a reaper, generally the wife, in harvest, without wages, get their victuals; porridge and milk to breakfast and supper, and bread and beer to dinner; 12 pound weight

avoirdupois of oatmeal makes a breakfast for eight reapers; ditto for supper, milk, more or less abundant, but never less than one English pint; if milk not in sufficient quantity, an English pint of small beer, which cost in 1790, £1. 1*s.* now, 1803, £2. 4*s.* per hogshead; dinner, a loaf of mixed flour, viz. one bushel of oatmeal and two bushels of wheat flour (all the wheat is grinded down) which is baked into nine dozen of loaves, and weigh each twenty-two ounces avoirdupois; one loaf to each person. The rent of the garden is always two, and generally three hens, called *Kain fowls.* The labourers are hired by the year, *wet and dry*, that is, constant employ and pay, at one price for the year, as marked in the paper.

A *bind*, that is, a married ploughman, in 1790, his wages were 54 bushels of oats, 15 bushels of barley, 6 bushels of pease, a cow's feed summer and winter; a reaper, *Kain fowls*, and the carriage of coals as above; now, 1804, one quarter more of corn.

Generally the threshing corn was by lot, that is, the twenty-fifth quarter; this rule held for every species of corn; now we have threshing mills by water, where a fall can be found, a few by wind, most commonly by horses. A six-horse power mill will thresh easily from six to eight quarters of wheat in the hour, but the horses must walk four miles in the hour to give sufficient velocity and *impetus* to do the work well, any inequality in the motion makes very unclean threshing.

EXTRACTS FROM THE REPLIES TO THE SECOND LETTER OF INQUIRY.

CAMBRIDGE.

Mr. Charles Wedge.

I THINK where two horses are sufficient to work a plough, one horse is kept on an average to every twenty acres of ploughed land; and every horse will furnish employment (exclusive of harvest) for half a man and a quarter of a boy.

	£.	s.	d.
The half man cannot be laid at less than	15	0	0
The quarter of a boy	5	0	0
Blacksmith, per horse £. 3 0 0			
Wheeler 1 0 0			
Collar-maker 0 10 0			
	4	10	0
Keep of horse	15	0	0
	39	10	0
For every 100 acres	£. 197	10	0

The above articles do not vary in proportion to the value of the land.

CHESTER.

John Thomas Stanley, Esq.

THE expenses of farming seem to have increased about a fourth within the last twelve years; the profits have certainly not increased in the same proportion. Agriculture must necessarily suffer, if some measures are not taken to secure to those engaged in it, their fair and accustomed gain. It will be a bad policy to drive all men of capital and intelligence into trades, which cannot enable them to add so much to the real wealth of the nation, as they could when they were stimulated in the character of farmers scattered over the country, to improve the land to its utmost, to increase the numbers of cattle, horses, sheep, farm buildings,

and all kinds of agricultural stock; and to awaken the industry of the common people, and tempt them to apply their labour to the most useful purposes. Trade may appear to enrich a country more than agriculture, by more immediately introducing into it the gold and silver of other nations; but gold and silver are not either industry, food, raiment, or dwelling, and they are of use only as they act as stimulants to produce either some or all of these. How far they do this (securing independance at the same time), must be determined, before their value is appreciated. Money is the exciter of labour; and if, when we have got it, we send it again abroad to excite the labour of foreigners, towards the supplying us with any one article requisite for our strength or comfort which might have been provided by our own industry, we shall have lost, and they have gained, a certain portion of power and industry, or real wealth.

A farmer who, in the course of a few years, doubles a capital of £1000. may have added much more to the force, and to the mass of comfort in his country than the manufacturer, who in the same time may have made 10 of his £1000. In the one case, the nation may possess, instead of so many acres capable of producing food for twenty families, as many, producing food for forty families; and instead of several idle and beggarly peasants, at least as many laborious, healthy, well clad, and well lodged labourers, all fond of comfort, and of course having many wants; in other words, all exciteable to the utmost exertion of their powers. These labourers, by their earnings under the farmer, may each of them have procured a cow and a pig, and converted a piece of a common near them, into a field and garden, capable of supporting them. In the other case, after the manufacturer's retreat with his £10,000. the nation may contain a large cotton work more than it had before, just of as much value as the wood and bricks contained in it; and the knowledge of spinning and piecing cotton threads, obtained by two or three hundred individuals, at the expense of their health, their morals, and their agricultural knowledge and inclination. If government considers only the facility of raising a loan, the unapplied £.10,000. in the hands of the manufacturer, will be compared with the farmer's £.1000, and the exertions of the first estimated as of the greatest value; but short-sighted indeed must be the politician who forms his judgment of the utility of men's occupations from no other source than the possible ultimate gain in money of a single individual at the head of a concern. The manufacturer may be growing rich, while his manufactory is

absolutely impoverishing his country. Suppose the people employed in a cotton work to receive their food from abroad, that all the corn they consume came from America; such an establishment then would have produced the effect (by diminishing the numbers employed in agriculture) of increasing the prices of agricultural labour, without having increased the value of agricultural produce.

After all, we have no assurance that the manufacturer will employ his money, when he has got it, to augment the industry of his own countrymen. It may very possibly be lent to an American or West Indian adventurer. It may contribute to the production of wheat or sugar on the other side the Atlantic, which American ships, filled with American sailors, may bring over to Europe, stimulated by the money gained, perhaps in England, by some other manufactory. Thus the whole business of trade and manufactory, however apparently advantageous, may become injurious to our best interests; but no one will contend against its essential and probable uses. I only am anxious our statesmen should allow that trade ought to follow, and not take the lead of agriculture.

It is clear, that a province containing 100,000 individuals capable of supplying each other, in all seasons, with the first necessaries of life, would be a greater addition to the strength, and welfare of the nation, than a town containing the same number, engaged in trade exclusively, and dependant on foreigners for food; it would be much more likely to have an encreased prosperous population, and to improve its real wealth, its morality, and consequently its happiness. Its interests would be the part likely to be affected by war, and not only the best armies but ultimately the greatest revenue, must be forth coming from it. In fact, towns are necessary evils in our system; their very prosperity produces luxury, feebleness of character, selfishness, and vice. The numbers of men of abilities they contain, who cannot have the least experience of the operation of any one law or measure, on the state at large, by their eloquence and publications; and the mobs, by their threatenings, induce, nay force, government very often to sacrifice to a mere temporary interest, the soundest principles of policy. If possible, the population of a country should be kept diffused over its whole surface; at any rate, no artificial inducements should be allowed to draw men from where they can be of the most, to where they must be of the least use. Now the unequal distribution of the publick burthens, inclines a great part of the community to take shelter, as it were, in towns. Many articles of a country establishment can be dispensed with, without loss of

comfort, in a town. Many of the assessed taxes, indeed, fall almost exclusively on the man resident in the country; a horse and a man servant are as requisite for the enjoyment of social intercourse, indeed for daily occupation, as a pair of legs, when the circumference, within which you have to move, contains many square miles instead of a few streets. The window-tax too, though not so exclusively as the horse tax, must fall much heavier on the country, than on the town establishment; as it must necessarily be composed of more individuals for a constancy, and be the occasional abode of many more, if any hospitality, or even family communication takes place. Many more of the assessed taxes may be thus shown to afford a premium, as it were, in favour of town habitation. But the system of the assessed taxes, though affecting agriculture by accumulating population, and lessening, amongst persons of moderate fortunes, a taste for country life, or rather depriving them of the power of enjoying it; is but a small part of the main system of taxation hostile to the landed interest, which has been invented in the last century, and lately followed up with so much alarming assiduity. It is impossible for agriculture to thrive, when only half the produce of every acre is allowed to remain the property of the owner; for if all the taxes now laid upon the land-owner were to be enumerated, they would, at the least, amount to this. The poor rates indeed, I have heard, often amount to this, exclusive of all other taxes; but take the average payments of the country and the average of the seasons, and it will be found that 100 acres will not afford their owner the same enjoyments which 50 acres would, if neither the publick, the church, nor the poor, shared with him in their produce.

The absolute exclusion of corn grown on untaxed land in other countries, from the markets in plentiful years, is the least favour the land-owner has a right to expect in return for his submission to the payment of so much greater a proportion of the publick burthens than the rest of the community; out of policy the public ought to go farther, and secure him, whatever might be the demand for his corn in the markets, a price affording a fair profit, and add bounties to bounties on exportation, till this was done. But, I cannot help thinking a better mode than the payment of bounties might be adopted; for if the demand for corn for our own consumption, could in any ways be increased, a higher price would be the natural consequence. At present it is thought both wise and politic to diminish, as much as possible, the consumption of corn; the less the nation consumes, the less

dependant, it is said, it will be on other nations for supply; but is it admitted, that whatever might be the encouragements, this island can never be able to produce a sufficiency for its own inhabitants? You, my dear Lord, have made yourself so much master of the subject, that if our opinions differed, I would submit mine to yours; but now that experience has taught me, how much more than the farmer's average crop (with his slovenly feeble tillage) can be produced, by an expense of labour and capital from the same surface, I incline to the idea, that we have within ourselves the means of supporting at all times, even in the worst seasons, a far greater population than we have at present. As an excitement to industry, and to the application of capital to land, we must however have good prices for our produce. Prosperity and low prices are incompatible. What does the Manchester cotton-spinner mean, when he says his trade is dull? he means what the purchaser of his cottons would think a very good thing, that his muslins and his dimities are very cheap. But high prices can never take place while consumption is thought an evil. Let us part from the principle that England can grow corn enough for its population in a good year; let us suppose its soil improveable, and its crops, by labour and industry, capable of increase; it may then be allowed, that we might produce a great deal more corn than we want in a good year. Enough say, to maintain our population in a bad year. Where can be the policy then (if all this be granted) of teaching our people to consume as little corn as possible; and if those taxes which diminish the demand for it, the most fertile country in the world might experience a famine, if no more corn was produced in it in a good year, than the inhabitants could barely consume; in truth, if government has ever thought it wise to encourage exportation, it has declared that it would be wise to encourage consumption; for the sending the corn out of the kingdom was never done with any other view than that of increasing the farmer's profit; I have therefore only to wonder it should have been the only mode of raising the price of corn ever resorted to. Now, if no prohibition existed against the use of beer, as a beverage for the whole country, and the use of horses of every kind and description, you would have an immediate increase of demand for corn, which, if you checked importation, would throw up the prices as high as any farmer in conscience could desire, and we should have twice the quantity sown next year that we have now, certainly a great deal more; and let the next year to that be as bad a year as possible, the common people would only have to give up their beer, and the rich to dispose of some of

their horses, and not a man need eat a loaf less of bread through the kingdom. The malt tax and the horse tax certainly act as prohibitory laws against both the use of horses and beer. The effect of the one is, that beer is banished from the farmer's table, and in no community was a greater sacrifice perhaps ever made to revenue; a tax, high enough to drive people from the use of wheat, in the shape of bread, as of barley in the shape of drink, could scarcely have produced a greater diminution of comfort, or of agricultural profit.

Almost as great a sacrifice to revenue, is that which the farmer makes when he gives up his riding horse, which in many instances he is induced to do; he may ride, if he pleases, the advocates for the tax will say; look to the effect, and see whether a fine of £2. for every horse used, acts as prohibitory or not; but he loses also by the diminished demand for corn, which the lessened quantity of horses in the island has occasioned. Horses have ever been considered as a most essential part of the real wealth of every nation, and as necessary for its safety, comfort, and improvement, as ships, powder, houses, roads, canals, wood, men, or money; horses form a component part, not only of the agricultural but of the military strength of a people. It has been the boast of this country, that on an emergency our force in cavalry could be instantly trebled or quadrupled; that Englishmen were naturally all horsemen, and had every man his horse. Can it be politic for the comparatively trifling sum the tax gives government, to discourage this propensity? Is it not to a great degree desirable, that every gentleman, every farmer, every farmer's son, servant, and labourer, should love horses, understand their breed and management, and use them, how, where, and when they please; their use saves time; they give locomotive power; they promote intercourse. All kinds of horses have been taxed; the horse even that draws the farmer's cart and plough. It is no perversion of language to say the plough and the cart are taxed. The loom, the labourer's spade, might as well be taxed. One argument used for this last part of the tax, is, that it might force the farmers to use oxen instead of horses, but cui bono. It is a doubtful point, amongst both the practical and theoretical farmers, whether on any farm, oxen are (all things considered) preferable to horses. Let food be valued on one side, time on the other, and two opinions may perhaps never exactly meet; but on many farms, in many cases, in many counties, horses must be used, no choice can be exercised.

If these means, namely, a permission to the people of Great Britain, of drinking beer as their ordinary beverage, and to keep as many horses as they pleased, were

not sufficient to increase the demand for corn, equal to the farmer's ability of producing it, and no others could be discovered, then bounties on exportation had better be resorted to, or the superfluous quantity bought up by government and thrown into the Thames, rather than that the industry should be lost which preserves your independance, and your security against a famine.

ESSEX.

Lewis Majendie, Esq.

Rates and Taxes in 1790, were £22. 10*s.* in 1803, £45. 2*s.* 6*d.*—In calculating this item, a great difference appears between 1790 and 1803; if we take the increase of *all* public and parochial taxes, for what is borne by the farmer in common with other classes, ought not to be reckoned; the whole of the horse tax is placed to his increased expenses. The farm of 100 acres will employ 4 horses, the tax on which will be £1. 17*s.* 6*d.* on three, and £2. on the fourth, as a riding horse. Poor rates differ in every parish, but in the aggregate the increase is great during the interval in question; a growing evil, the consequences of which are much to be feared.

Labour—4 men 48 weeks in 1790, at 8*s.* per week, and harvest at £4. each. In 1803, 10*s.* per week, and £6. the harvest month.

As the farmer produces his own seed, no difference seems necessary to be noted; the additional expense of growing it is charged in the advance of other articles. In May 1790, wheat sold at £14. to £14. 10*s.* per load at Halsted market, and barley at 24*s.* Seed was dearer in 1790 than in 1803.

Few arable farmers purchase manure in these parts. Chalk is at the same price as in 1790, as well as clay marle; but where manure is really purchased, an advance of one-third has occurred since 1790.

What is intended by team is not clearly comprehended, so as to induce a proper answer to this query, unless it respects the *renewing* a team. Suppose a horse bought at 3 years old, and that horse lasts till he be 15, the proprietor, keeping 4 horses, would want a horse every third year, which in 1790 he might have bought for £16. but in 1803 it would have cost £24. being £3. per annum nearly in advance, to keep up his team; but if he breeds and rears colts, this does not seeme to apply.

HERTFORDSHIRE.

J. Forster, Esq.

CHARGES upon 100 acres of common field land, two-thirds corn and one fallow.

1790.	£.	s.	d.
Rent	50	0	0
Tithe, 2s. 6d. per acre	12	10	0
Rates and taxes, poor rates 5s. in the pound	12	10	0
Wear and tear, viz. Blacksmith £.6 0 0; Wheeler 8 0 0; Collar-maker 2 0 0	16	0	0
1 ploughman, at 8s. per week, and 1 ditto at 7s. for 11 months	33	0	0
2 labourers 3 months, at 7s. per week each man	8	8	0
2 boys 11 months, at 6s. per week the two	13	4	0
4 harvest men, at £4. 7s. 6d. each man	17	10	0
2 boys, at £1. 18s. 6d. each boy	3	17	0
17 acres wheat, 20 bush. per acre, threshing 2s. per qr.	4	5	0
17 - barley, 32 - - - - 1s. 2d. -	3	19	4
16 - oats 24 - - - - 1s. -	2	8	0
16 - peas 20 - - - - 2s. -	4	0	0
Labour -	90	11	4
Seed for 17 acres wheat, 3 bush. per acre, 6s. 6d. per bush.	16	11	0
Ditto - 17 - barley, 4 - - 3s. - -	10	4	0
Ditto - 16 - oats, 5 - - 2s. 6d. -	10	0	0
Ditto - 16 - peas, 5 - - 3s. 6d. -	14	0	0
Seed -	50	15	0
Oil dust for 17 acres wheat, 2 qrs. per acre, £2. per qr.	34	0	0
Ditto - 17 - barley, 2 - - -	34	0	0
Manure -	68	0	0
Food for 4 horses 1 year, at £20. per horse -	80	0	0

Capital.	£.	s.	d.
4 horses, at £22. per horse -	88	0	0
2 cows - - -	20	0	0
100 sheep - - -	100	0	0
3 carts - - -	39	0	0
3 ploughs - - -	4	4	0
2 pair of harrows - - -	2	2	0
1 roll - - -	3	0	0
2 drags - - -	1	4	0
Forks and shovels, &c. -	1	0	0
20 pigs - - -	20	0	0
Saddlery - - -	12	0	0
Labour - - -	90	11	0
Food for 4 horses - -	80	0	0
Capital -	461	1	0
Interest of capital - - - -	23	1	0
	£.403	7	4

1803.	£.	s.	d.
Rent - - - - -	£.75	0	0
Tithe, at 4s. per acre - - -	20	0	0
Rates and taxes, poor rate 8s. in the pound, horse and income tax - - - -	25	4	0
Wear and tear, viz. Blacksmith 8 0 0; Wheeler - - 10 0 0; Collar-maker 3 0 0	21	0	0
1 ploughman, at 10s. per week, and 1 ditto at 9s for 11 months - - - -	41	16	0
2 labourers for 3 months, at 9s. per week each man	10	16	0
2 boys, at 8s. per week for 11 months, the two -	17	12	0
4 harvest men, at £6. 5s. each man - -	25	0	0
2 boys, at £2. 12s. each boy - - -	5	4	0
17 acres wheat, 20 bush. per acre, threshing 3s. per qr.	6	7	6
17 - barley, 32 - - - - 1s. 10d. -	6	4	8
16 - oats, 24 - - - - 1s. 6d. -	3	12	0
16 - peas, 20 - - - - 1s. 8d. -	5	6	8
Labour -	121	18	10
Seed for 17 acres wheat, 3 bush. per acre, at 7s. per bush.	17	17	0
Ditto - 17 - barley, 4 - - 2s 6d. -	8	10	0
Ditto - 16 - oats 5 - - 2s. 6d. -	10	0	0
Ditto - 16 - peas, 5 - - 4s. -	16	0	0
Seed -	52	7	0
Oil dust for 17 acres wheat, 2 qrs. per acre, £3. per qr.	51	0	0
Ditto - 17 - barley, 2 - £3. -	51	0	0
Manure -	102	0	0
Food for 4 horses for 1 year, at £25. per horse -	100	0	0

Capital.	£.	s.	d.
4 horses, at £28. per horse -	112	0	0
2 cows - - -	28	0	0
100 sheep - - -	150	0	0
3 carts - - -	45	0	0
3 ploughs - - -	4	14	6
2 pair of harrows - -	2	10	0
1 roll - - -	3	5	0
2 drags - - -	1	7	0
Forks and shovels, &c. - -	1	5	0
20 pigs - - -	25	0	0
Saddlery - - -	14	0	0
Labour - -	121	18	10
Food for 4 horses - -	100	0	0
Capital -	609	4	0
Interest of Capital - - -	30	9	0
	£.547	18	10

LANCASHIRE.

Henry Harper, Esq.

WHAT are the charges upon 100 acres under the following distinct heads; viz.

	1790. £.	s.	d.	1803. £.	s.	d.
Rent	175	0	0	233	0	0
Tithe	77	18	4	77	18	4
Rates and taxes	30	12	6	69	18	0
Wear and Tear.						
Blacksmith	15	0	0	28	0	0
Wheelwright	15	0	0	30	0	0
Collar-maker	3	10	0	7	0	0
Labourers Beer, Board, &c.						
4 Mens wages per year	40	0	0	60	0	0
Ditto board, &c. for ditto	41	12	0	62	8	0
2 boys wages per year	10	0	0	15	0	0
Ditto board, &c. for ditto	20	16	0	31	4	0
Beer for six servants	4	0	0	6	0	0
Extra labour in harvest	22	0	0	34	0	0
Extra Charge.						
In disposing and delivering corn	2	0	0	3	0	0
Seed	59	16	0	59	16	0
Manure purchased	99	0	0	165	0	0
Team.						
6 horses keep, corn, hay, &c.	120	0	0	144	0	0
Wear in 6 horses, including losses, &c.	15	0	0	25	0	0
Interest on capital	37	11	0	46	13	6
Being the total of expense £.	788	15	10	1097	17	10

Cr. for 1790.	£.	s.	d.
By 300 quarters of wheat, at 52*s.* per quarter	780	0	0
By straw, 100 loads, at 15*s.* per load	75	0	0
By 60 tons of manure, at 6*s.* per ton	18	0	0
	873	0	0
Expenses	788	15	10
Clear profit for 1790	£.84	4	2

Cr. for 1803.				£.	s.	d.
Expenses				1097	17	10
By 300 quarters of wheat, at 52*s.* per quarter	780	0	0			
By straw, 100 load	100	0	0			
By 60 tons of manure, at 10*s.* per ton	30	0	0			
				910	0	0
Total loss in the year 1803				£.187	17	10

1. Rent one-third more clear to the proprietor in 1803 than in 1790.
2. Tithe, one-tenth part of same value in 1790 as in 1803.
3. Rates and taxes, double and three-eights more in 1803 than in 1790.
4. Wear and tear double in 1803 to what it was in 1790.
5. Labour, beer, board, washing, and lodging, one-third more in 1803 than in 1790.
6. Seed of no more value in 1803 than it was in 1790.
7. Manure as dear three-fourths as much in 1803 as it was in 1790.
8. Team, 6 horses value in 1790 £15. each horse, for which I allow £2. 10*s.* for the wear and accidental losses for each horse.

Team, 6 horses value in 1803 £25. each horse, for which I allow for wear and accidental losses on each horse £4. 3*s.* 4*d.* Their value being more in 1803 than in 1790, therefore the wear and risk of loss is more, which I value for both wear and accidental losses, always at one-sixth part of their value for each horse.

Query the 4th, wear and tear is charged for 1790 and 1803, is not to buy

new, but to maintain and keep up a reasonable and fair stock of implements, as brought on the farm, the same at going off as coming on the farm.

The keep of horses in corn is no more in 1803 than in 1790, but the rise in rent, &c. makes their keep in hay, grass, &c. considerably more, for which I have added one-fifth more for each horse.

If I am called upon to know how the work is to be executed on the 100 acres, by the four men and two boys, and six horses; I say, there are 365 days in the year, from which take 52 days they leave 313, and take from these 30 days for rainy and bad weather, leaves 283 working days for both man and horse. So with my six horses I make sometimes only two teams, but mostly three, for 283 days, which I order to work as follows, viz. First, a pair of horses cart all my produce to Liverpool, both corn and straw, which, from 100 acres, at 3 quarters of wheat per acre, are 300 quarters, at 8 quarters each load, are 38 loads; 100 loads of straw, both take up 138 days; and the team in returning from Liverpool, each journey, brings me back to the land one ton and a half of manure, or 207 tons, then I want 123 tons more to make up my number 330 tons, which take up 82 days, added to 138, make 220 days, which deducted from 283, leave 63 spare days.

Now my manure is accounted for, how is it to be got on the land? The 330 tons of manure I allude to, is to manure one-third part of the 100 acres, at ten tons to each acre; by getting 330 tons every year, I manure the 100 acres of land all over once in every three years, and by so doing, and working the land well, and keeping it clean, it will produce me the three quarters per acre, as before alluded to.

I am then to plough and get my land in order for sowing the seed, which I sow on every acre 105 pounds, and plough the 100 acres four times over; and one plough ploughs me five acres in six days, which occupies 480 days to plough the land.

For that service I have two teams of two horses each, and each working 283 days, make 563 days, from which take 480 days leaves 83 days, and 63 days before accounted for, make 146 days. Now to get on the manure; 330 tons, with three teams of two horses each, at 12 tons per day each team, spread on the land take up 9 days, and from 146, leaves 137, which divide by three, leaves 45

spare days for each team and men for getting in the harvest, and any other unforeseen business that may fall out, such as a few days harrowing or ploughing up any strong land for the first time, that may require a three-horse plough. All this is performed by three men and two boys. The boys, as I call them, are to be fifteen and sixteen years of age, as I allow sufficient wages to have them at that age, and at any labour they will be equal to a man; they will be each of them able to reap as much corn as a man.

I come now to reaping and getting in the harvest, which my six people are to reap 20 acres and get in all the harvest, which is uncertain to account for, whether it be long or short; all depends on the weather; the time I take out of the 137 spare days, which I have for both man and horse. I now come to thrashing out the corn: 300 quarters are 2400 bushels, which one labourer will thrash out at 5 bushels each day, and winnow and clear away the straw, which to execute at that rate will take 480 days, and there are only 313 working days, take 6 days off for pleasure, leaves 307, which from 480, leaves 173 days not yet accounted for, which are to be done by the two boys and one of the men, with the spare time they will have through the year, and will perform with ease; the other two men are to take care of the horses, and do any necessary business that the land may stand in need of.

In ploughing, when the land has got into an easy tilth, the horses are to go double, and the ploughman is to hold the plough and drive the horses at the same time, by which mode of working, the horses will plough an acre and a half every day, which will gain a deal of time both for man and horse, and they will do their work with great ease, more so than with one horse going before the other. But if the land is too heavy for them, and they cannot step away, as a pair of horses in a carriage, the plough will not work well nor steady. All this business, both of team work and labour, is to be done with ease to a practical farmer who knows when he has a day's work done, and at the same time as it should be, without injuring either man or horse; but without the farmer knows the nature of all kinds of work and business, he will get imposed upon, and always be behind hand with his work, of whatever kind it may be; but the true way of managing land, for whatever use it may be, is to drive the work, and not let the work drive the occupier.

It is a general rule among farmers on arable farms, to wish to plough a deal of land, which, so far as I have experienced, is a mistaken notion, for if you over plough and have more in tillage than you are able to manure, and keep in good condition, and properly clean, so as to be sure of having good crops according to the season, you get yourself into a deal of work, and waste seed, and make land foul and full of weeds, and in bad condition for any kind of crop the ensuing year, not fit for any thing but a summer fallow, which summer fallowing is not the true mode of farming, but I do not totally explode it myself, particularly if in a country where land is naturally poor, and manure scarce. I begin with a wheat crop, and all other crops in the same proportion, according to value. Suppose I have 30 acres for wheat, the land in no great condition, and rather poor of itself, and I cannot manure it all, I then run a risk whether I get two quarters per acre, or not. Suppose I have only 20 acres, and it is in my power to work and manure it well, so as almost to assure myself three quarters per acre, if not more; and from the 30 acres I only get 2 quarters per acre, or but 60 quarters, it takes 7 quarters of seed to sow it. Now, if I have only 20 acres, and 3 quarters per acre, it is 60 quarters, and only takes for seed not quite 5 quarters; then I am getting as much produce from 20 acres as from 30, and saving 2 quarters of seed and one-third less labour, and ten acres of land, which will produce something or other if ever so poor; if it produce even nothing but couch-grass, it will be a help to maintain stock of some kind, or if ploughed, it might give vetches with one furrow, which are a very beneficial crop upon any kind of land to cut as a green crop, and will not impoverish but will mellow the land, and improve it for any other crop the ensuing year. Thus over ploughing on any kind of farm is both a loss to the farmer and the community at large; for the fresher the land is in any country, the more corn it will produce.

If the 100 acres of arable land had been divided into three lots, say 40 acres of wheat, 30 of barley, 30 of oats, the barley land would take all the manure, (330 tons) and would make but a poor return for the present year; but as clover and grass-seeds are mostly sown with barley, so the produce of the clover will only come in the ensuing year, which will pay the rent of the land, taxes, &c. and make up the deficiency both of the barley and oat crop; and afford more clear profit than the 100 acres all in wheat. The expense of seed and culture, reaping, &c. would be nearly the same as for wheat.

But to make my calculations appear more satisfactory, I have here annexed another statement:

				1790.		
				£.	s.	d.
40 acres of wheat, at 3 quarters per acre, 120 quarters, at 52s. per quarter				312	0	0
30 ditto of barley, at 4 quarters per acre, 120 quarters, at £1. 6s. 8d. per qr.				160	0	0
30 ditto of oats, at 4½ quarters per acre, 135 quarters, at 23s. per quarter				155	5	0
40 ditto of clover, &c. at 1½ ton per acre, 60 tons, at £4. per ton				240	0	0
40 ditto of second crop, at ¾ ton per acre, at £1. per acre				40	0	0
40 ditto of wheat straw, at 15s. per acre				30	0	0
60 ditto of barley and oat straw made into manure, 150 tons, at 6s. per ton				45	0	0
				982	5	0
40 acres by proportionable part of rent, £175. per year		70	0 0			
by ditto of taxes for one year, at £30. 12s. 6d. per year		12	5 0			
				82	5	0
Net produce for 1790				900	0	0
Total of expenses				788	15	10
Clear profit by this mode, for the year 1790				111	4	2

				1803.		
				£.	s.	d.
40 acres of wheat, at 3 quarters per acre, 120 quarters, at 52s. per quarter				312	0	0
30 ditto of barley, at 4 quarters per acre, 120 quarters, at £1. 6s. 8d. per qr.				160	0	0
30 ditto of oats, at 4½ quarters per acre, 135 quarters, at 23s. per quarter				155	5	0
40 ditto of clover, &c. at 1¼ ton per acre, at £5. per ton				300	0	0
40 ditto of second crop, at ¾ ton per acre, at 25s. per acre				50	0	0
40 ditto of wheat straw				40	0	0
60 ditto of barley and oat straw, made into manure on the farm, 150 tons, at 10s. per ton				75	0	0
				1092	5	0
40 acres, by proportionable part of rent £233. per year		93	0 0			
by ditto for taxes for one year, £69. 18s. per year		27	19 2			
				120	19	2
Net produce for 1803				971	5	10
Total of expenses for ditto				1097	17	10
Total loss in 1803				126	12	0

	1790. £.	s.	d.
Clear profit by cultivating wheat, barley, oats, and clover	111	4	2
By cultivating wheat only	84	4	2
Balance in favour of wheat, barley, oats, and clover	27	0	0

	1803. £.	s.	d.
Total loss by cultivating wheat only	187	17	10
Total loss by cultivating wheat, barley, oats, and clover	126	12	10
Balance in favour of ditto	61	5	0

N. B. Out of my 40 acres of wheat and 30 acres of oats, I choose out 10 acres, either from the wheat or oats, which ever will best answer to sow with clover, in addition to my 30 acres of barley land, which makes the number 40 acres for clover. But this is to be done with care and judgment, so as not to put the farm out of its proper rotation of crops, to get one year and lose another.

LINCOLNSHIRE.

J. Linton, Esq.

I TAKE the liberty of remarking, that the circumstances which existed about the year 1790, do not afford a fair criterion for deciding on the prices at which corn ought to be sold. About that time the value of corn was much depressed, tillage was checked, and scarcity ensued. The effect of the measures then taken, have made us still more depend for a supply of corn on importation, and if the discouragements under which agriculture suffers are not removed, the evil will still increase.

In fixing the prices at which the importation of foreign corn ought to be permitted, I hope that the difference between the price paid to the grower, and that ultimately received from the consumer, will be taken into consideration. The farmer in Lincolnshire receives for his corn 4*s.* per quarter less than it is worth when conveyed to and resold in Mark Lane; consequently, to allow oats to be imported when the price in London is 18*s.* per quarter, is to admit foreign oats when the growers here receive the inadequate price of 14*s.* only.

Christopher Morley, Esq.

I BEG leave to mention a circumstance that is very injurious to the industrious farmer; that is, the inequality of the measure of corn. Farmers who wish to make use of the Winchester bushel experience great difficulty in disposing of their produce to the best advantage, as they are generally scouted by the corn buyers, and are obliged to procure bushels of thirty-three and thirty-four quarts, to the great loss of themselves and families. If I am not mistaken, a great many of the corn-factors and malsters, who buy corn by that extra measure, sell out by the Winchester bushel. It would undoubtedly be of great utility to the farmer, if the legislature would take this national business into their most serious consideration, and establish one standard measure throughout the whole kingdom.

John White, Esq.

THE greatest disadvantage this division of the county suffers, is the *excessive price of labour*. In the year 1790 we paid from 10*s.* to 12*s.* per acre for corn reaping, and in the year 1803 the average price was about £1. 1*s.* per acre. In the year 1790, the price of labourers per day, in the winter and spring seasons, was from 1*s.* 3*d.* to 1*s.* 6*d.* In the year 1803, the same labourers had 2*s.* 6*d.* per day, and some of the better sort of them would not work for that price, without some allowance of beer. Now it is a well known truth, that within 15 miles of this place (in any direction where the high country begins) their corn is reaped, stacked, thatched, and in fact *completely harvested*, for considerably less than half the price we pay here for the reaping only, and the labourers there, in winter, work for nearly half the price, and a full hour longer in a day than they do here; yet notwithstanding this disparity of wages, they support their families with more credit, and considerably less parochial assistance, than they do in the levels of Lincolnshire. There is but one reason to be assigned for it, and that is the extreme dissipation and extravagance of the lower order of people.

A very few years back, a bill was introduced into the House of Commons, to prevent the cutting of navigable canals, &c. during the harvest month; and the throwing out of that bill was matter of serious injury to the farmers of this country, and to some others likewise, where the works of canals and embankments are carried on. I do not recollect the name of the honourable member who opposed

the bill, though I perfectly remember the fallacy of his argument, which was only, "*That labourers ought to make the most money they can of their labour, without* "*any restraint laid upon them:*" very well, we will grant all that, but the opposer of the bill did not know, perhaps, that those men can earn 10*s.* a day in reaping, where they will not get above 5*s.* at canal cutting; but the fact is, they dont like reaping quite so well, because they are obliged to work a few more hours in the heat of the day, whereas, in their own trade of embankment, they leave off work at *two o'clock*, and work no more till next morning. As the war has drained the country so much of labourers, those ablebodied men would be found extremely useful in the month of harvest. Perhaps if the bill was introduced a second time, *(and I seriously recommend the introduction of it to the Honourable Board of Agriculture)* it might not meet with the same opposition; even if it did, the calculation derived from its benefits, summed up, might be sufficient to confute any arguments that could be brought forward against a bill so essential to the interests of agriculture. I have not a single doubt but the opposition made to the aforesaid bill originated with some *undertaker of canals*, who thought, that whilst his gangs were engaged at harvest-work, he should be losing his own profits, ARISING FROM THEIR LABOUR. The harvest of the year 1803 was a very favourable one; had it been a bad, (or what we here call a slack harvest) certain I am, that half the corn in those levels must have been lost for the want of *money*, and labourers to get it in; and after the most favourable harvest, what has it done for the farmer; what kind of profit has it left behind when all expenses are paid? As fairly as I can calculate, an acre of oats (after a fallow) will leave the farmer a clear profit of about £1. 13*s.*

I must also (with your Lordship's permission) beg leave to mention another most important difficulty, a truly serious oppression to every occupier of land; I mean the surprising increase of the poor and other parish rates, which, from the year 1790 to the year 1803, have increased *nearly double*, though the price of corn in those two years was very near equal. If any one asks what can make the farmer so poor, or what must prove their ultimate ruin at last, I can only say, it must be the extreme dearness of labour, and the excessive increase of parochial rates; for compared to them the rents are nothing, and the assessed taxes a matter too trifling to be noticed; and unless some timely remedy is applied, through the wisdom of parliament, inevitable ruin must be the consequence. I confess myself totally

incapable to think of any *certain* remedy that can check the increasing expense of labour; but as to the scandalous increase of parish rates, I think it requires but little ingenuity to bring about something of a reformation. The abuse of parish offices has been a subject very long and very justly complained of, and I have often wondered that it never seriously occupied the attention of parliament more than it has done, but, like an infectious disease, is suffered to run on and spread itself, till it becomes incurable. One or two bills to this effect has of late years been introduced into the House of Commons, and if I recollect right, the greatest statesman in Europe pledged himself (in some measure) to introduce a bill for this purpose; but I know not how it is, the bill has not yet appeared.

NORFOLK.

Mr. Henry Burton.

An account of the produce and expenses upon one hundred acres of arable land, in this part of Norfolk, to be farmed in five equal shifts or portions:

			£.	s.	d.
20	acres of	wheat produce 120 combs, at 24*s.* per comb -	144	0	0
20	-	of barley produce 200 - 12*s.* - -	120	0	0
20	-	of oats, *second crop*, produce 200 combs, at 10*s.* -	100	0	0
20	-	of turnips produce, by purchasing stock and feeding in the yards, 80*s.* - - - -	80	0	0
20	-	of artificial grass, sufficient for feeding horses in summer and hay in winter.			
100					
		Note. There will be some small matters, such as pigs, fowls, &c. in the yards, pay about - - - - -	15	0	0
		Produce	459	0	0

				Brought over	£.459	0 0
Deductions.						
Rent of said 100 acres of land			£.100	0 0		
Tithes of said land, if *compounded* for			25	0 0		
Poors, church, and surveys rates			30	0 0		
Two labourers the year, including board and beer			52	0 0		
One labourer 30 weeks, at 10*s.* per week			15	0 0		
To a labourer for threshing the corn, as above			19	13 0		
To ending the corn, over or above, labourers board and beer included			30	0 0		
Blacksmith's bill	£.10	0 0				
Wheeler	4	0 0				
Collar-maker	3	0 0				
			17	0 0		
Carpenter's bill for repairs of gates, &c.			1	10 0		
Seed corn, small seeds			45	0 0		
Horse corn for six horses, to till said land			20	0 0		
Manure must be purchased yearly, over and above what is made from the *produce*			20	0 0		
£600. capital must be employed on the above scale to allow 8 per cent. interest			48	0 0		
					423	3 0
					£.35	17 0

The assessed taxes are not stated; as such must be paid out of this balance, here will be small profit left.

WILTSHIRE.

Thomas Davis, Esq.

The writer hereof begs leave to draw the attention of the Corn Committee, to the necessity of a total abolition of the assize of bread. Notwithstanding all that the bakers may say to the contrary, the price of bread in London, for six months past, has been 1*d.* higher on a quartern loaf than in the country, or than can be warranted from the price of wheat; though it must be allowed the advantage has gone to the flour-factors and not to the bakers.

The whole system was devised by the flour-factor when the last act was passed, and is calculated entirely for their benefit.

The writer could explain this more fully, if desired by the Committee; but he begs leave to observe, that while it is impossible to *make any gauge for the fineness of flour*, it is impossible to regulate the weight of bread, to any good purpose.

The only use of a law for that purpose, is to put into the power of bakers to take advantage of it, while, at the same time, the flour-factors draw it again from the bakers into their own pockets.

Competition in the price of bread will do much more to reduce the price of it, than any laws to direct the weight of it.

WORCESTERSHIRE.

Nathaniel Kent, Esq.

In and a few years prior to 1790, it was a rule with me, in estimating a fair rent upon a farm, supposing it to consist of three parts arable and one part grass, to allow four rents to be made; and at the present time, on account of the increase in labour, the rural trades connected with it, and the increased taxation, I am inclined to think, that unless a farmer can make five rents, he cannot live in any degree of comfort. You will however observe, that this mode of calculation ought to vary a little according to the nature of the soil. If it be sandy, or a friable loam, somewhat less should be allowed. If it be wet, heavy, cold, cohesive, or stony, a little more ought to be allowed.

Let us suppose the medium, and the form to be set according to this scheme, at £200. per annum, then it will be grounded on the following proportions:

	£.	s.	d.
First, It will require at least £1500. to stock such a farm; the common interest of this is £75. and allowing £25. more for risk and casualties on stock, this is equal to half a rent - -	100	0	0
The tithes and parochial rates will be equal at least to another half	100	0	0
The labour and rural tradesmen's bills, connected with the farm, will be equal at least to two years rent - - -	400	0	0
The rent speaks for itself - - - -	200	0	0
And then the tenant gets for his time, his judgment, and the support of his family (as little as he ought to get) one other year -	200	0	0
The whole is equal to five years rent - - -	1000	0	0

Accompanied with this, I inclose a letter from a Mr. Vaizey, of Halsted, Essex, upon a subject that may not be undeserving of the attention of the Board.

"From accidental knowledge I have obtained of your being extensively concerned for very considerable landed estates in different counties, and the propriety there appears in the following subject coming under the notice of as much of the farming interest as possible, I take the liberty to present to you a few thoughts that have been much the discussion of this part of the county of Essex, and to which we have obtained the attention of several gentlemen in the landed interest, and among the Committee now sitting on a revision of the corn laws.

"A material argument in favour of such revision, seems founded on an idea that the existing laws do not sufficiently protect the growth of our own country. This appears too evident to doubt; and if so, a reasonable query arises as to the propriety of the same principle being applicable to every description of crop, as far as its importance (under every consideration) may extend.

"The cultivation of *clovers* has long been considered a useful and important part of our husbandry, and perhaps it may be called (in many districts) *an essential.* A considerable part of England, (more especially the southern and western counties I apprehend) have been in the practise of raising seed from red and white clover, and trefoil; and often these have been found a profitable species of crop. The produce in itself is naturally precarious, and the price has been as much so, frequently bearing no proportion to *our* quantity grown.

"This disproportion of price to the crop, will necessarily have made the growing seed a speculation with the farmer, and it has generally been *provided for* every year, according to existing circumstances. Importation of foreign seed has given a general current to the prices of our market, probably with little respect to the produce of our own country.

"It is the opinion of many old experienced farmers, that the cultivation of *clovers* might be *extended* to advantage without *lessening* our produce of grain, but perhaps to *increase* it in many cases; and that, under our present plan, no doubt but an increased growth of seed might be promoted, to considerable advantage and profit to our farming. I will leave this question to other judgments, and beg your attention to the propriety of *restricting duties on the importation of foreign seed* as well as corn. It is said, that from 1 to £200,000. has been annually paid for foreign seed, hitherto chiefly from France and Holland, and some little lately from

America (which appears likely to increase); and probably should no restriction interfere, our growth will be superseded by foreign. The importation has hitherto been, I understand, under a *regular* duty of 6*s.* per cwt. Should you think, Sir, that the growth of *clover* SEED is, upon the whole, a benefit to the several counties you are acquainted with and interested for, I would beg to submit, *whether our increasing the provision for seeding*, and to circulate *part or all* of the money we send (wholly from our agriculture) to a foreign market, among the tillers of our own soil, might not be a national benefit; it would certainly be profit to our farming. In consequence of the representation that has been made to him, Mr. Western, M. P. for Maldon (who is one of the Corn Committee) has moved in the House of Commons for a return of seed imported, &c. for seven years past, (which you have probably observed) as a foundation for further proceedings on this question, and perhaps so favourable a time may never offer for the proper investigation of it, should the present be passed over. There is no doubt but objections and queries will arise to any measure of this sort, more especially as I apprehend this has hitherto in general been little thought of, and questions of various descriptions will be started, on the policy of restrictions by any altered duty.

" Possibly it may turn out not to be right; but it is much to be wished that the first appearance of objection should not be yielded to, as many very fair arguments have been advanced, and, as far as common observation goes, there seems a balance decidedly in favour of restricting duties, made *to vary* according to the corn duties; to be regulated by the prices of our market.

" It is essential to the *proper issue* of this subject, that an extended interest should be discovered in it, from every county concerned in growing clover, could it be possible; (but how difficult this is to obtain *on any matter whatever from my brother farmers* in general, I need not observe to you, I am sure) and unless some superior description of attention to that of farmers in general can be excited, I feel but little hope to see much. It is with a view to the furtherance of this, that I venture to give you the trouble of this. I know of no notice, except from Hertford, Suffolk, part of Norfolk, and this, where all I have heard of has been but merely private correspondence of this description.

" Thus much appears, however, pretty clear; if there was a good reason for the legislature fixing a duty of 6*s.* per cwt. many years since, on importation, the same *rate of charge* cannot now apply. The only fear I feel, is from a want of proper and respectable recommendation to the Corn Committee, to get its fair investigation."

LANERK.

Mr. John Naismith.

THE rise which has taken place in the rent of land since 1790, is almost incredible. In the sheep farms, on the mountains of the upper ward, it is doubled; in the arable parts of the same ward, the rise is from two to three-fifths of the former rent. In the middle and lower wards, wherever leases have lately expired, the rent is in all cases doubled, and in many tripled. The great rise on the price of live stock, justifies a considerable rise on the rent of breeding farms; the dairy also is much more productive: but the excessive rise on the rent of arable farms is quite unaccountable. A sensible expert husbandman, who has occupied a farm since the year 1769, and kept regular books and registers of all occurrences to this time, showed me a curious statement he had lately made. He had made up accounts of his outlay of every kind on one side; and all that he had received for the produce of his farm on the other, for the three years near the commencement of his farming; this he had contrasted with similar accounts for the three last years: the result was, that the balance in his favour was near to £30. on an average yearly less in the last period than in the first. The farm is upwards of 150 acres, mostly arable; part is pastured in rotation, a dairy kept, and some young cattle reared; there had been only one moderate rise of rent. If such be the case in general, as it is believed, it will frequently be found the great rise of rents must ruin the agriculture of the country, by diminishing agricultural capital, and dispiriting the cultivators.

The cost of preparing an acre of turnips has increased in proportion to the increase on the articles of which it is composed. At present the following is a state of these expenses in the upper ward.

2 ploughings, 2 ridgings equal to 1 ploughing, makes three, which with harrowing, at 8*s.* each	£1	4	0
25 cubic yards of dung, at 3*s.* 6*d.* £4. 7*s.* 6*d.*; carriage, spreading, &c. 8*s.* 6*d.*	4	16	0
Sowing seed and rolling	0	3	6
First and second hand hoeing 4*s.* 8*d.*; 2 horse hoeings 5*s.*	0	9	8
	6	13	2
If the land be full of rooted weeds, an additional ploughing and breaking must be given, which will cost	1	0	0
	7	13	2

An acre of barley may be prepared for the same cost.

In the middle and lower wards, the cost of preparing an acre for turnips or barley, will be fully one-fifth more.

In the dense soils of the middle and lower wards, the expenses of preparing an acre of wheat by summer fallow, is nearly as follows:

	£.	s.	d.
5 times ploughing with harrowings - - - -	2	15	0
40 cubic yards of dung, with carriage and spreading - -	11	10	0
Seed, sowing and harrowing in - - - -	1	3	0
	15	8	0
Lime is also frequently given, 6 chaldrons of which, with carriage, &c. will cost about - - - - - -	4	18	0

To all this the rent of the land must be added.

But land is now less frequently prepared for wheat by summer fallowing: it has been found to succeed very well after potatoes or beans, and sometimes upon a clover stubble. The potatoes are planted in rows, at 2 feet 3 or 4 inches asunder, dunged, and kept clean by hand and horse hoeing. The land is dunged for the beans, and, of late, the beans are frequently sown in rows, from 20 inches to 2 feet distant, clean first with the hand hoe, and the earth afterwards laid to the rows with a plough. A moderate crop of potatoes or beans defrays the expenses of manure, culture, &c. and the preparation for wheat costs only a single ploughing, seed, and harrowing in.

The price of manures is greatly increased since 1790. About that time a cubic yard of dung could have been got in Glasgow and Hamilton for 1*s.* 6*d.* or 1*s.* 8*d.* The price rose in Glasgow, in the year 1800, to 5*s.* 6*d.* and is now about 4*s.* but at 5 or 6 miles from that city, it has been lately valued at 5*s.*; and some has been sold in Hamilton still higher. All carts in this county are drawn by a single horse, and a cart will now hold fully a cubic yard of dung. The price of lime is advanced about a half since 1790, it is now about $4\frac{1}{2}d.$ per bushel of slacked lime.

No. IV.

An Account of the Produce of Milk and Butter from a Cow, the Property of William Cramp *of Lewes, in the County of Sussex, for one Season, commencing the 1st Day of May, 1805, (that being the Day she calved), up to the 2d Day of April, 1806, a Space of 48 Weeks and 1 Day.*

BUTTER.	No. of Weeks.	Pounds per Week.	Quantity of Butter	Sold at per lb.	Total value.
				s d	*£ s d*
From the 1st of May to the 7th of May, kept no account; sold the calf - -	1	—	—	—	1 7 0
From the 8th of May, to the 25th June	7	15	105	1 6	7 17 6
From the 26th June, to the 10th Sept. -	11	14	154	1 6	11 8 0
From the 11th Sept. to the 29th Oct. -	7	12	84	1 6	6 6 0
From the 30th Oct. to the 3d Feb. 1806	14	10	140	1 6	10 10 0
From the 4th Feb. to the 10th March -	5	8	40	1 6	3 0 0
From the 11th March, to the 24th March	2	7	14	1 6	1 1 0
From the 25th March, to the 2d April, left off milking - - - - - -	1	3	3	1 6	0 4 6
	48	—	540	—	41 14 0
Deduct for Butter sold in the month of August 1*s.* 4*d.* per lb. only for three weeks	-	-	-	-	0 7 0
					41 7 0

MILK.

			Quarts.
From the 8th May to the 25th June	20	quarts per day -	980
From the 26th June to the 10th Sept.	18½	ditto per day -	1424
From the 11th Sept. to the 29th Oct.	16	ditto per day -	785
From the 30th Oct. to the 3d Feb. 1806.	12	ditto per day -	1176
From the 4th Feb. to the 10th March	11	quarts per day -	385
From the 11th March to the 24th March	9	ditto per day -	126
From the 25th March to the 2d April	5	ditto per day -	45
			4921
The milk being measured when milked from the cow, there must be deducted for cream - - - - - -			540
			4381

	£.	s.	d.
4381 quarts of skim milk, at one penny per quart - - -	18	5	1
Made in the course of the season, four large waggon load of dung, worth fifteen shillings per load, thoroughly rotten - - - -	3	0	0
	62	12	1
Total expence	21	6	2
Profit £	41	5	11

EXPENCE.

	£.	s.	d.
Grains consumed the summer 26 weeks, $3\frac{1}{2}$ bushels per week, at 4*d.* per bushel - - - - - -	1	10	4
Bran, $1\frac{1}{2}$ bushels per week, at 8*d.* per bushel - - -	1	6	0
Winter 26 weeks, grains consumed, 8 bushels per week, at 6*d.* per bushel - - - - - - - -	5	4	0
Bran, 4 bushels per week, at 8*d.* per bushel - - -	3	9	4
Half an hundred weight of hay per week, at 5*s.* 6*d.* per cwt. -	3	11	6
Rent of the land whereon were raised the lucern, clover, carrots, &c.	0	15	0
To the wages of a man at the rate of £52. per annum, supposing him to attend ten cows, the tenth part of which is - - -	5	4	0
To the farrier for three drinks at the time of calving - -	0	6	0
£	21	6	2

The cow was fed with artificial grasses, sown on the following plats of ground within the walls of the prison, containing by measurement as follows:

	Rood.	Perch.
No. 1. A plat sown with red clover and rye-grass, containing	0	19
No. 2. ditto sown with lucern - - -	0	2
No. 3. ditto sown with cow-grass and white clover -	0	17
No. 4. ditto sown with red and white clover - -	0	18
No. 5. ditto sown with lucern - - -	0	$10\frac{1}{2}$
No. 6. ditto sown with carrots - - -	0	$2\frac{1}{2}$
	1	29

The above crops of lucern were cut four times, and the clover three times during the season, producing (each time) good crops. The cow not allowed to feed on

the grass ground, but cut and given her in a rack in her hovel, where she has a plat of about 18 square perches to range in. I keep but this cow, nor have I had any other since I had her. She is seven years old, and has had five calves; has been in my possession for two years.

Consumed much less food this year than the year before.

Food and Treatment.

Summer season fed on clover, rye-grass, lucern, and carrots, three or four times a day, and at noon time about four gallons of grains, and two of bran mixed together; always observing to give her no more food than she eats up clean. Winter season fed with hay, bran, and grains, mixed as before stated, feeding her often, viz. five or six times a day, as I see proper, giving her food when milking; keeping the manger clean where she is fed with grains; not to let it get sour; wash her udder at milking times with cold water, winter and summer. Never tie her up; lays in or out as she likes; particularly careful to milk her regularly and clean. Milch cows are often spoiled for want of patience at the latter end of milking them.

One man would attend ten cows through the year (with the exception of an assistant at milking times). Feeding milch cows as above stated, they will at all times be in good condition fit for the butcher, if an accident should happen. There will be no ground trampled and food spoiled by cattle running over a vast track of land. I think cattle may be fattened by the same mode of feeding with much advantage; one fourth part of the land would feed them, a great quantity of manure made, and the beast fatten much sooner. Cattle so fed, have nothing to do but fill themselves and lie down to rest. *No labouring for their food.* I fattened the two cows I had before this, and made them very good meat in about seven weeks, (I found it to answer, although I bought the food at a dear rate), giving them a little ground barley or oats mixed with the grains and bran. I think cows would nearly double (in the course of the season) their quantity of milk and butter by following the above plan. It is unnecessary for a cow to go dry long before she calves. The thing will tell for itself. When her milk changes brackish, she should then be dried off; that may be, in three, four, or five weeks before she calves. Milch cows seldom go dry before, unless it is from neglect, poverty;

sickness, or bad milking. Let the milk stand two days in summer, and three days in winter, before it is skimmed. I have stated no more than one penny per quart for skim milk, but I am informed it sells in the town of Lewes for three halfpence, it being worth one penny to put in the hog tub. I fattened two hogs in the summer with no other food than skim milk and grains, making them very good meat, weighing 16 or 18 stone each, at 8lb. per stone. Where cows are kept in this way, hogs should be kept, as the milk will be (in the summer time), thick and sour, and fit for nothing else but hogs. The people of this country making no use of it as food.

The following is the Pedigree of the Cow in question, which I received from Mr. Holman, a respectable farmer at Bentley, in the County of Sussex.

The cow belonging to Mr. Cramp, was bred by John Holman (my father) at Bentley in Framfield in the county of Sussex, from a Sussex bred cow, also bred by John Holman, on the same farm. She was got by a bull bred by Mr. Colgate at Hampstead farm in Framfield aforesaid; the father of which bull was also bred by Mr. Colgate, for which he obtained a prize cup at Petworth, on the 20th day of November 1796. She was calved in March 1799.

(Copy.) Witness, THOMAS HOLMAN,
Lewes, March 1806.

N. B. My cow calved on the 19th day of April, the calf in very fair condition; the cow having been dry for seventeen days *only*, was taken bad with the yellows at the very time of calving, but is now recovered, and going on very well. The calf sold at twelve days old for £1. 10*s*.

WILLIAM CRAMP,
Keeper of Lewes House of Correction.

Lewes, May the 10th,
1806.

No. V.

On the Means of supplying Milk for the Poor. By John Christian Curwen, *Esq. M. P.*

My Lord,

The increased spirit with which agricultural pursuits have been carried on for some years past, in every part of the United Empire, may in no small degree be attributed to the zeal and attention of your Honourable Board.

The encouragement it has held out, has proved a powerful inducement for undertaking different experiments; and by the communication of their results to the public, much useful knowledge has been diffused.

Confiding in your experienced indulgence, and stimulated by the premium offered for the management of winter dairies and supply of milk for the poor, I beg leave to submit, with great diffidence, the result of what I have done in the last two years, towards accomplishing those objects.

The vicinity of a large and populous town had previously afforded me an opportunity of being acquainted with the great scarcity of milk, and consequent sufferings of the poor, especially where there are young families, from the impossibility of obtaining, for the greatest part of the year, a supply at any price.

My attention had long been called to the subject, and the accidental perusal of a tract* intended to show the number of lives lost to the community for want of this salubrious aliment for young children, determined me on making the experiment of furnishing a plentiful supply of new milk during winter.

I am fully aware that, to enable the public to reap any extensive advantage, I must be able to demonstrate that a fair and adequate profit is to be made; with this view my first enquiries were directed to ascertain the most usual modes of feeding dairy cows during the winter months, in the neighbourhood of large and populous towns, as also the expence attending it.

I found, wherever any quantity of milk was supplied, that the principal dependance was upon grains got from breweries or distilleries, and hat it was not to be obtained in any profitable quantity without them.

* By Samuel Ferns, M. D.

The daily expense of the feed of a milch-cow near London, is estimated during the winter months at two shillings per day. The usual allowance as under:

	£.	s.	d.
One and a half bushel of grains - -	0	0	9
Two bushels of turnips, at 5*d.* per bushel -	0	0	10
Twelve pounds of hay - - -	0	0	5
	0	2	0

Where hay alone was given, or in chief part, I was not so fortunate as to be able to find a single instance, in which any steps had been taken to ascertain the quantity of hay consumed in the feeding one, or any number of cows; or the supposed expense attending it. The answer my enquiries received, in one of the first dairy districts near to London, where hay only is used, was, "That they "gave just as much hay as the cows would eat." From the few trials I have made with the long-horned cattle, I am inclined to believe a milch-cow would consume in the twenty-four hours, from two stone to two stone and a half of hay.

The objections against feeding with hay are, First, the expense, which is much too high in the situations where milk is most required, to enable the dairy-man to afford it, either in sufficient quantities, or at a price to benefit the poor. Secondly, there are, besides, few populous towns so circumstanced as to admit of a sufficient quantity of hay-ground being procured for the support of an extensive winter dairy; but, Thirdly, supposing it could be had, the superior profits to be made by a summer dairy would decide in favour of applying it to that purpose.

Most farmers consider it as more profitable to make butter in winter, than to sell their milk. I strongly suspect their calculations on this subject are not very correctly made, as I shall endeavour to show.

Having no means of procuring grains, and the price of hay precluding the possibility of employing it in feeding milch-cows with any prospect of advantage, I was driven to the necessity of adopting some other method.

On the first proposition for substituting green-food for the support of my dairy in winter, I was discouraged by a very prevalent opinion, that they could not be kept in condition, or health, on this food alone. I should most probably have declined the attempt, had I not witnessed the complete success of other experiments, as much at variance with received opinions and common practice.

Having matured my plan, I determined to appropriate twenty two acres of land, within less than a mile of a town containing eight thousand inhabitants, to its supply with milk, and the support of my other stock, during the winter months. I was in a great measure ignorant of the quantity of green-food that would be required for each head of cattle.

The ground was cropped with four acres of cow cabbages; six acres of common red turnip; two acres of Swedish turnip; one of kohlrabi; and nine acres of cole-seed. The milch-cows were turned out in good weather into a dry sheltered pasture of sixteen acres, which had been so hard stinted, as to afford them little or no food, but had the advantage of plenty of good water.

In the beginning of April, 1804, the cabbages were transplanted; by this early planting they have always succeeded better than those of my neighbours, which were later. The turnips were sown by the drill, in stitches at three feet distance, and the utmost attention paid to the cleaning of the whole, not only for their benefit, but for that of the succeeding crops. The turnips proved a failing crop in many parts, the other crops very good.

The stock of cattle fed in sheds consisted of thirty-three: twenty-two milch-cows, eight of them had been spring calvers, the remainder heifers. I notice this circumstance, to account for the apparent smallness of the quantity of milk afforded.

I was so circumstanced as to be necessitated to dispose of the greatest part of my stock before my winter crop was exhausted; having no preparation to continue feeding them in the house during summer, nor any distant pastures of less value than the lands I occupied near to the town, to continue them for another season. Much of the success of the experiment depended upon the condition the stock should be in, to enable me to dispose of them early, and with little loss. I had eight three-years old heifers, intended to be kept for stock; a bull and four cows for fattening; and besides these, I wintered thirty-five head of Highland heifers, and sixty-five sheep.

In dry and moderate weather, the milch-cows remained out from ten o'clock till towards evening. From their being kept in open sheds they were less sensibly affected by the cold. A greater degree of warmth is supposed to be favourable to their milking; but I do not believe, so kept, they would have been in equal thriving and healthy condition.

I found it advisable to make use of the cabbages first; they required much labour

and unremitting attention to be freed from decayed leaves; and after frost, the difficulty is still greater. It is however indispensably necessary to prevent the milk from being tainted.

The cabbages planted were the drum-head cabbage. I wish an equally weighty and more hardy kind could be obtained, that would stand the winter better, as the cost of cleaning and stripping the decayed leaves, tends greatly to reduce their value.

The common turnip followed; next the Swedish and kohlrabi; and last the cole-seed. This latter article of food I found to be most productive of milk, and it has the further advantage of standing till the end of May, by which time lucerne is fit to be cut.

I made a further experiment in feeding milch-cows, by giving oil-cake; this novelty encountered still greater prejudice. On trial it soon appeared that the milk was considerably richer, its flavour not affected, and the quantity much increased.

To this I attribute the uncommon condition of the whole stock so fed. The certificates, which accompany this, will be fully satisfactory upon that point.

My dairy commenced the 1st of October 1804, and continued constantly supplying the town till the 18th of May 1805. As a part of the heifers were not purchased till late in October, and not all in milk till the middle of November, I have extended the period thirty days above the two hundred, to complete the period for the whole stock upon which the calculation of food is founded, which will exceed, some little, the 200 days.

The time of milking in the morning was between six and seven; immediately afterwards a feed of cabbages was given, so long as they lasted. At ten o'clock, previous to turning out, two pounds of oil cake each. In favourable days they had turnips in the pasture with the tops and tails cut off; on returning to the sheds they were served with cabbages; between that time and four they were milked: this was followed by a second allowance of two pounds of oil cake each; afterwards a third feed of cabbages; and at six o'clock a foddering of straw from six to eight pounds.

The labour of cutting off the tops and tails of the turnips was amply compensated for, by the advantage of feeding the wintering Highland cattle with them in preference to straw.

The expense of green food does not stand the farmer in one halfpenny per stone; the tops and tails must be considered of still less value: whilst straw cannot be

estimated under two-pence; notwithstanding the disparity of cost, there is still a greater difference in their nutrition. What I wintered as above, upon the refuse of green food, were in condition for killing two months earlier, and exceeded any of the same kind I ever had, both in weight of carcase and tallow, and brought from two to three pounds per head more than I had ever obtained before.

The plan I have followed in estimating the profits upon the experiment, is, in the first instance, to put a value upon the green crop, supposing it to be sold by the farmer to the milkman. I have afterwards united the two profits. I may be supposed to have over-rated the cost as well as the value of the green crops; this, however, is matter of opinion, and must depend in a great measure upon situation. The cost of cleaning drilled turnips much exceeds the broadcast, yet I have no doubt whatever, the weight will amply compensate for the expense; and, when the drill husbandry is properly attended to, will greatly exceed the general estimate of fifteen tons per acre. I shall endeavour to ascertain this fact against another year.

The apparent profit upon the milk, falls short of what I expected, and what I am confident it might and ought to have been, under proper management. It is sufficient, however, to encourage the hopes at first entertained of the practicability of the measure, and to determine me to proceed with the experiment.

With the experience I have gained, I have no doubt I shall exhibit a very different result of profits in the next year's trial.

Value of the green crop, upon a supposition of its being sold to the cow-keeper.

Twenty-two acres of green crop, at £10. per acre - -		£.220	0 0
Estimate of expense attending the raising of each green crop, with cleaning, &c.			
Four acres of cabbages, at £12. per acre -	£.48 0 0		
Two acres of Swedish turnips, at £5. per acre -	10 0 0		
Six of common red turnips, at £4. per acre -	24 0 0		
One of kohlrabi - - - -	5 0 0		
Nine of cole seed, at £3. 10s. per acre - -	31 10 0		
		118	10 0
Gain on the crops -		£101	10 0

The improvements in the land and value of succeeding crops is supposed to be adequate to the rent and taxes.

Value of the land 40*s.* per acre.

Poor cess under 1*s.* 6*d.* in the pound.

Expense of feeding twenty-two milch-cows for 200 days; each acre is supposed to produce 15 tons, or 2400 stones.

Allowing four stones of green food to each cow per day, for 200 days, would require seven acres.

	£.	s.	d.
Seven acres of green food, at £10. per acre	70	0	0
Four pounds of oil cake each, for 22 milch cows 200 days	69	8	0
Straw ditto, at 1*d.* per day ditto	18	6	8
Attendance, at 40*s.* per head	44	0	0
Interest on capital, valuing each beast at £13. £8.; expense of purchase 3*s.* £3. 6*s.*	11	6	0
Risk and loss by resale, after the rate of 30*s.* per head	33	0	0
By profit of milk	47	2	8
	£.293	3	4

Had the cows been tolerably well managed, the profits would have been double at least.

Money received for the produce of twenty-two milch-cows for 200 days.

	£.	s.	d.
By milk, butter, and calves, sold	224	0	0
Two calves reared with milk	20	0	0
Supplying five persons in farm-house, at one quart each per day	4	3	4
600 carts of manure, at 1*s.* 6*d.* per cart	45	0	0
	£.293	3	4

Oil cake is too costly to be given with advantage, except to cows in full milk.

The eight spring calvers so fed, at a cost of £26. 13*s.* 4*d.* gave so trifling a quantity of milk, that three parts of this expense might have been saved, and made the profits above £60. Six calves were lost, which was a further deduction of £12.

It will appear obvious, from the sum charged for rearing two calves, that breeding cannot be attempted with a view to profit, where milk can be sold at 2*d.* per quart wine measure.

Expense of feeding stock upon fifteen acres of green food.

	£.	s.	d.
Estimated cost of 15 acres of green food, at £10. per acre -	150	0	0
Eight three-years old heifers intended for breeding, fed with oil cake 4 lb. per day each - - - - -	26	13	4
Three cows fattening, 7 lb. dittò per day each - -	16	13	4
Carting turnips to the above, and wintering stock - -	28	15	6
Interest on value of the above estimated at 400, expense of purchasing included - - - - - -	12	11	0
Gain upon stock - - - - -	86	16	10
£.	321	10	0

Manure, from feeding with oil-cake, is of double the value of common cow-dung.

Gain upon sale of the stock on 200 days feeding.

	£.	s.	d.
Three cows fed 200 days, cleared £13. each; cost of feeding £10.; profit £3. - - - - -	39	0	0
Twenty wintering Highland heifers, cleared £3. 10s. each; cost of feeding £1. 10s.; profit £2. - - - - -	70	0	0
Fifteen fat ditto killed in six months, cleared £4. each; cost of feeding £1. 10s.; profit £2. 10s. - - - -	60	0	0
Sixty sheep, cleared 10s. each; cost of feeding 6s.; profit 4s. -	30	0	0
Eight three years old heifers, fed equal to milch-cows, supposed to make an advance of £10.; feeding £7.; profit £3. - -	80	0	0
One bull, feeding £10. supposed advance £5. - -	15	0	0
300 carts of manure, at 1s. 6d. per cart - - -	22	10	0
Half an acre of Swedish turnips for horses - - -	5	0	0
£.	321	10	0

The feeding stock, after the rate of the three years old heifers, can never answer at the common prices of cattle.

Expense of attendance on milch-cows and other stock for 200 days.

	£.	s.	d.
Dairy maid's wages	5	0	0
Board wages	9	0	0
One man and horse for sale of milk, and leading green food, at 4*s.* 6*d* per day	45	0	0
One labourer, at 9*s.* per week	13	10	0
	£.72	10	0

Cost of feeding milch-cows per day.

	s.	d.
4 stone of green food, at 1*d.* per stone	0	4
4 lb. of oil cake, at 1*d.* per lb.	0	4
8 lb. of straw	0	1
	0	9

The feeding cattle had 7 lb. of oil-cake, which made the expense of these 1*s.* per day. The dairy maid's wages were wholly charged to the milk account, though by much the greater part of her time was employed in the farm-house. Some occasional assistance in milking was given, but by no means equal to what is overcharged to the dairy on her account.

Twenty pounds of butter were made per week, by which, I am very confident, I was a considerable loser. The skim milk was included in the butter account, and the quantity sold not ascertained. New milk was sold for 2*d.* per quart, wine measure; skim milk for 1*d.*

There were sold during the whole period 17,410 wine quarts; on an average 87 quarts per day. The demand was so great that the cart was met before it reached the town, and the whole disposed of, morning and evening, in little more than an hour.

The forward condition of my heifers made them sell early in the spring, and with less loss than I expected. I have estimated it at what I am told would be a fair average, one year with another. The price of cattle depends upon the season, and the quantity of fodder which remains on hand.

It was allowed by the dealers and others, there was no stock in the neighbourhood, however fed, that were in any thing like the condition of mine. To be able

fully to ascertain and establish this fact, is to remove a very weighty objection to the plan. Supposing the profit of the farmer and milkman united.

	£.	s.	d.
Gain upon 22 acres of green crop - - - -	101	10	0
Ditto on milk £47. 2s. 8d. Ditto on wintering stock £86. 16s. 10d.	133	19	6
	£.235	9	6

Had the whole been well conducted, the profit should have been £300. out of which taxes, rent, &c. must be deducted.

Let us suppose thirty-three head of cattle to have been fed on hay, and that each consumed two stone per day; estimating the produce of an acre of hay at one hundred and sixty stone; at this rate it would have required eighty-two acres to have fed them for 200 days, admitting the after-grass to have been adequate to the support of thirty-five head of Highland heifers, and sixty sheep for the like space of time. If I am correct in this calculation, there will be found a clear gain to the public of sixty acres of land in the feeding of this trifling stock.

A moderate acre of green food, is supposed to produce 15 tons, or 2400 stone; but, with the drill husbandry, I conceive the weight will be considerably greater. After the rate of four stone per day, an acre would supply food for one beast for 600 days. At the rate of two stone of hay per day, it would require seven acres and a half, but say seven, allowing the half acre for the straw likewise given. We ought, in striking the balance in favour of green crops, to take into the account the impoverishment of the ground by hay, and the improvement by green crops. The drill husbandry, under judicious management, is the best mode of improvement, and might be alternately practised with green crops till the end of time.

I should suppose that green crops, upon a comparative scale of feeding with hay, may be stated as seven to one.

The expense attending the making and getting of hay is, in many parts of the kingdom, very great, and liable to much disappointment, both as to quantity and quality. There are many chances in favour of green crops, from being sown at different seasons, and, in case of failure, the being able to renew them.

The advantages of feeding with green crops, are the saving of rent, and the profits of a great stock upon a little ground. As some deduction from this may be stated, the additional buildings which would be required, but this would be trifling, and bear no proportion to the profits.

Potatoes and carrots, &c. will exceed seven times the comparative feeding of hay; and both these crops have the further advantage, they may be conveyed by water carriage from districts where rents are from 15*s.* to 20*s.* per acre, to where five or six pounds are paid, and labour proportionably high.

What encouragement does this hold out for the improvement of lands distant from populous towns, that have the advantages of water carriage!

Summer soiling, in comparison with grazing, will equal, if not exceed the proportion of seven to one, besides the almost incalculable advantage of preserving the manure.

I cannot omit stating the great profit of carrots. I have found, by the experience of the last two years, that where eight pounds of oat feeding was allowed to draft horses, four pounds might be taken away and supplied by an equal weight of carrots, and the health, spirit, and ability of the horses to do their work, perfectly as good as with the whole quantity of oats. With the drill husbandry and proper attention, very good crops of carrots may be obtained upon soils not generally supposed applicable to their growth. Under proper management an acre of carrots I conceive to be worth fifty pounds.

A saving of sixty acres of land in a farm of six hundred, in the feeding of cattle alone, opens a wide field for speculation. The retrenchment of a tenth, with a gain to the public of the means, if applied to the growth of corn, of supporting in bread one hundred and eighty persons, cannot fail of calling forth serious reflections, and challenging attention to the important advantages which might be drawn from the general adoption of this system.

However great and desirable the object of supplying milk to the poor, we lose sight of it in contemplating the prosperity and happiness that would result to all ranks of the community, from being enabled to produce sufficient grain of British growth, not only to feed our present population, but to supply the means of providing for a considerable addition to it.

Is it possible to contemplate the saving of sixty acres of land in feeding so small a stock, without being struck with the powerful resources which the public as well as individuals have in their power to draw from the adoption of such a plan upon an extensive scale?

May I hope, through your indulgence and permission, to be excused in offering

a few remarks upon the subject, which I trust will not be deemed irrelative, or wholly unconnected with that immediately before me.

Previous to entering into this discussion, I must beg to state, in addition to the saving made in feeding of cattle, there are annually forty acres or upwards of potatoes planted upon the same farm for feeding of horses, and given as a substitute for hay. An acre of potatoes produces upon an average fourteen hundred stone. Two stone of steamed potatoes, mixed with cut straw, are given daily to each horse: thus, an acre of potatoes produces food for one horse for seven hundred days. Computing one hundred and sixty stone of hay to an acre, and allowing only a stone and a half to be given per day, with a small abatement for waste, an acre would feed one horse for a hundred days; the scale of comparison therefore, in feeding, between potatoes and hay, will be as seven to one. Agreeably to this calculation, forty acres of potatoes are equal, in point of feeding horses, to two hundred and eighty of hay; and have the further advantage that, under proper management, the wheat after potatoes will not be inferior to a fallow.

By this system of tillage, in a farm of six hundred acres, a saving is made of three hundred and forty acres, above one half of the whole; which, supposing it were cropped with wheat, would supply bread for the consumption of above a thousand persons. There were likewise cultivated upon the same farm four acres of carrots, which, in feeding horses, equalled thirty acres of oats.

Besides the stimulus arising from individual emolument, which has hitherto been derived from this system, I have been strongly impelled to an extension of it, from the decided opinion I have long entertained, that nothing could contribute so essentially to the welfare and security of the empire, as being enabled to raise a sufficient quantity of grain for our support, and thereby to emancipate us from our dependance on foreign aid.

I lament, in common with many others, that the recent pressure so severely felt by the nation, did not lead to an immediate inclosure of all the wastes in the kingdom.

Independant, however, of eight millions of acres of wastes, which are supposed still to remain, and from which little profit is derived, I conceive it to be not only feasible but perfectly practicable, by a change of system, and adopting a plan of feeding horses and cattle in houses and sheds, both summer and winter) to make

such a saving of land as would accomplish this desirable object. Each acre so employed, as I have endeavoured to show, might be made to produce seven times the quantity of food raised from an acre of hay or pasture. The advantages derived from green crops, upon the present narrow scale, must be considerable: in what state would the agriculture of Norfolk and Suffolk be without them? Supposing the green crops in Great Britain to amount annually to a hundred and thirty or forty thousand acres, this would add a sixteenth part to the whole provision of the cattle and sheep.

Assuming the calculation to be sufficiently accurate for my purpose, which supposes England and Wales to contain about forty-eight millions of acres, and that twenty-one of these are under pasture for horses and cattle; I conceive a million and a half of acres might be taken from the lands in pasture, and brought under rotative crops, in aid of what is so applied at present.

I cannot entertain an apprehension, with the capital possessed by Great Britain, that any serious inconvenience could result to our general commerce, by the appropriation of such a sum as might be necessary to bring the lands so taken into cultivation; though I have heard such arguments gravely urged as an objection to a general inclosure. I should have no doubt of the means, and as little of the spirit of enterprise, provided it was clearly ascertained that the capital so employed would be equally profitable with other branches of commerce. To procure, in the first place, the additional number of hands that this extended cultivation would require, might be attended with some difficulty; but should the consequences of the encouragement given to agriculture prove a temporary check to our increasing manufactories, or even lessen the number of hands now so employed; so far, in my humble opinion, from its being injurious to the interests of the empire, I believe it would be found to promote them. I do, however, apprehend the hands necessary might be found without any interference with trade. Might not numbers of industrious hands be procured from the Highlands of Scotland, who, wanting employment, are obliged to emigrate to America? Numbers also might be drawn from Ireland, without any injury to its present state of agriculture and commerce. Should it cost the public half a million to settle the persons so collected in villages in different parts of the kingdom; could such a sum be better employed? the bounties of a few months would soon be swelled to a larger amount.

The increased demand for labour, with the means of subsistence at a *reasonable*

rate, would, in a very short period, produce an increase of population to answer all purposes.

The number of useful hands (by this means added to the population of the empire) would prove a powerful acquisition of strength. Can there be a more cogent argument in favour of growing the grain requisite for our own consumption? were all other considerations balanced, is not this one abundantly sufficient to decide upon the wisdom and policy of our attempting it? Under our present circumstances, one million of British subjects depend upon foreign countries for the means of their subsistence. In the course of time, when the north of Europe and America shall have made a further progress in manufactures, what is to become of that part of our population which is supported by them? If it be more advantageous to be a nation of manufacturers, than cultivators of ground, what country will continue to pursue agriculture for the benefit of another? If the example of Great Britain, in her predilection for manufactories in preference to agriculture, operates on other countries, the period is not distant when these supplies may be supposed to fail us. An alteration has been attempted in this system, and much appears to depend upon the firmness of parliament, whether it shall be persevered in, and encouragement be given for the growth of British grain; or whether popular clamorists shall prevail and defeat it, by acting upon the feelings of the moment; blind to every prudential consideration; regardless of future consequences; ignorant and insensible of our growing dependance on foreign countries for a very considerable portion of our daily-bread.

The elucidation thrown upon this subject (by the discussions on the corn laws which took place in the last two sessions of parliament) must, or at least ought, to have demonstrated to every unprejudiced mind, the necessity of efficient means being taken to encourage the internal growth of grain. However unbounded our capital, can the country be esteemed really flourishing or secure, whilst it is not possessed of the means of feeding its inhabitants? The temporary loss of our superiority at sea, hostile influence, or a combination on the Continent, might effect by famine what their attempts by open war, I trust, can never accomplish. Is there wisdom or policy in suffering the empire to remain dependant on circumstances, distinct from its courage and love of liberty?

The wild and preposterous speculations broached a few years back, that it was more for the interest of the nation to purchase than to grow grain, were well and

ably refuted by a noble Lord (Lord Sheffield) at the time. Experience has since fully proved the folly and impolicy of the system founded on this theory. Much praise is due to all those who contributed to the establishment of that venerable code which, for the space of eighty years, proved such a source of wealth and internal comfort to the nation. The Minister (Mr. Pitt) had great merit in resisting the clamour raised against the alterations in the corn laws, in the last sessions of Parliament. It was most satisfactorily and clearly proved, that those alterations had no influence in raising the prices of grain. They might, and I believe did, encourage a more extended growth of corn; and, by so much as they increased the quantity, contributed to keep down the price, and diminish the effects of a failing crop. What reason can there be to doubt, that a recurrence to the same measures, would be productive of the same effects? During the seventeenth century, and at almost every period of our history (previous to the establishment of the system of bounties on exportation) the prices of wheat were subject to great variation, and the average extremely high. For forty years previous to 1700, the average price of wheat was £3. 0*s.* 11*d.* per quarter; prior to 1650, £6. 8*s.* 10*d.* From the period that the corn laws were finally settled in 1700 or 1706, the prices became steady. And for forty years prior to 1750 wheat was at £1. 16*s.* per quarter: in the next forty years to 1790 the average was £2. 9*s.* 5*d.*; and for the last ten years £3. 6*s.* exclusive of bounties.

In the course of the last forty years the balance between the agricultural and commercial systems has been destroyed. The latter now clearly preponderates, and its excess is likely to became ruinous. The increase of wealth operating upon a decreasing supply of corn has greatly tended to aid in raising the price of labour to the injury of agriculture. The reduction of the price of labour cannot be effected, without a general abatement of all the objects which have been affected by it. The only means to prevent the ruin of our agriculture is to advance the price of grain. The same causes have not yet operated in the North of Europe and America; and they are besides exempted from our heavy taxation, which exacts so much from each individual; and appears an almost invincible barrier to our receding. These combined causes enable the North of Europe and America to furnish grain cheaper than we can grow it extensively. There are indeed many millions of acres in Great Britain that would produce wheat, was the price sufficient; but on which

it will never be grown whilst foreign grain can be imported as heretofore. And I still doubt the average is taken too low to produce any considerable change.

The situation to which the country is reduced, demands efficient measures to be taken, to rescue it from the distressed state into which it has been thrown by the predominance of commerce over agriculture. Every step we advance the difficulty will be greater. Remedies are never pleasant: when necessary, however, they should be enforced.

Grain, the prime necessary of life, must be had; and, if it cannot be grown at the prices hitherto paid, it is sound policy to advance them to what will stimulate the production of a quantity equal to our wants.

To accomplish this object (should it even be the means of a diminution in our manufactures), the nation would be no loser by it. Our supplying foreign countries with manufactured articles depends upon a variety of circumstances. Our demand and consumption of grain is certain. One may cease, the other cannot be dispensed with but by a diminution of our population. Could a more serious misfortune befal the country than to be driven to such an alternative?

Allowing the prices of grain were such as to make it the interest of the farmer to grow corn extensively, in preference to grazing, or fully on a par with it; can it be doubted that we should shortly be enabled to raise a sufficiency for our consumption? The profits of tillage, once fully established, would speedily effect a total revolution in the existing system of agriculture. When no longer the interest of the farmer to make use of every possible means of expeditiously turning his lands into grass, expedients would be as assiduously devised for continuing the lands in a fit state for cropping. And I conceive this to be practicable, without injury to the land or reduction of crops; for which we have not only the example of China, but the partial practice of different places in this kingdom. There are lands in the neighbourhood of London which have been cropped with potatoes for forty years without interruption. The alternate culture of wheat and beans is practised in many districts without variation.

I would not be considered as an advocate for the advance of grain beyond what would afford the grower a full, fair, and adequate return for his capital and exertions: which I do contend has not been the case in the last ten years, with the exception of those of scarcity.

The necessity of measures to create an advance may appear an evil, when grain for the present might be had from foreign countries at a cheaper rate. But the miseries which must and would ultimately result from an increasing dependance on foreign nations, would infinitely outweigh any present advantage. And besides it admits of considerable doubt, (taking the average of a few years back), whether it would not have been cheaper both to the nation and individuals, had measures, like the present, been taken some years ago, to advance and encourage the growth of grain at home.

Years of failure of crops must, in the course of events, be expected; a demand for importation beyond the usual supply, has an immediate effect on the foreign markets, and subjects us to whatever demands speculators may think proper to exact. Considering the few hands in which the foreign trade is placed, the means of combination are not very difficult. Widely different is the case with our home supply; when there are half a million of manufacturers of grain, the public has little to fear from monopoly;—by which system are we likely to be most cheaply supplied?

The price paid in our markets for foreign grain was not the price it cost the consumers; a most material addition must be made for the bounty, which did not enter into the contemplation of many of them.

However much the late high prices of corn are to be lamented, it must be granted some good resulted from it, by producing an activity, and accelerating improvements in agriculture in every part of the empire; which, in the ordinary course of proceeding, would have required many years to have accomplished. It has also created a spirit of enterprise, which may be turned to good account, and, from what we have seen done, we may justly entertain the most sanguine expectations of the further improvements which may be still effected. Without profits would the manufacturer continue to prosecute trade? can, or ought, the farmer be expected to do it? The alarming disparity which has taken place in the course of the present reign, between the growth of grain and our consumption, is a subject worthy of our most serious consideration. They who are inclined to attribute it solely to our increased population, look, I conceive, but partially at the question. Was this the fundamental cause, its effects would have been of a slow and progressive nature. The population of Great Britain is supposed to have gained in the last century an addition of nearly three millions, which would give an increase

of thirty thousand annually. Whether this may, or may not, have been the proportion, or that the increase may have been more rapid at one period than another, I shall not contend; but I think it will be acceded to me, that the checks on population have been greater, since the year 1760, than they were for fifty years preceding it. That the improvements in agriculture in the last fifty years, are more than double what they were in the former. And in addition to this we must add the inclosures of nearly 900 wastes and common fields.

The consequences resulting from all these circumstances must be a prodigious increase of victual, tending to form a counterpoise to our increase of population in the present reign. Besides, up to 1761, we had a surplus of 925,119 quarters of wheat, which alone would have fed 925,000 persons. Five years after this period, in 1766, we had barely sufficient for our consumption; and from that period we have been obliged, with little exception, to make great annual importations. Such a change is too great and too sudden to be attributed to a progressive cause, or annual increase of population, but must, I conceive, be looked for from other causes. And I think we shall find a most important change taking place about this period in the habits and modes of living of a considerable number of the people, and producing an alteration in the system of agriculture. That other causes have also contributed, I have no doubt.

There are, unfortunately, no means of investigating, by positive proof, the alterations, which must have taken place in the system of agriculture. It would, in my humble opinion, be productive of essential benefit to the empire at large, should an accurate survey be taken of the whole kingdom, and a register kept in every parish, of the appropriation of each acre of ground. By thus ascertaining the various crops, and the quantity being known of each kind of grain, Government would be enabled to take timely steps to provide against deficiences, and to enforce economy, which contributed largely in the late years of scarcity to the prevention of evils infinitely more grievous than those of price.

That a great and most material change in agriculture must have happened, I strongly suspect, within the last fifty years. The exportation in common years, up to 1761, was nearly equal to the growth of three hundred thousand acres. The largest year of importation since 1790 was adequate to the produce of nine hundred thousand acres, very little short of a third of the whole growth of the kingdom. Estimating ten millions of people in England and Wales, and our colonies, to be fed with

wheaten bread, one million supposed to subsist on barley and oats, and allowing a quarter for the support of each person; three millions three hundred thousand acres must be annually cropped to answer their consumption. Beyond this estimate must be added whatever is made use of in manufactures, which may extend to the produce of eighty or a hundred thousand acres. A twelfth part of this quantity is calculated to be deficient, and annually imported. In average years this would require the growth of near two hundred and eighty-five thousand acres.

It cannot be doubted, that the increased population of the country has had its share in creating the deficiency; but I consider the great and principal cause to arise from the increase of commerce, and the decrease of tillage. The wealth acquired by our various branches of manufactures has been the means of advancing wages, by which numbers of hands have been drawn from the country into towns. The consequence of which has been the entire change in their habits and modes of life; their former frugal manner of living is abandoned; they are no longer fed upon milk, cheese, and vegetables, with little or no animal food. *Less than two acres and a half* was then amply sufficient for the support of a labourer.

The whole body of manufacturers (as well as most of those employed in great towns), are since that period subsisted upon butcher's meat, with the constant use of malt liquor, and, I fear, the pernicious habit of using spirits is but too common amongst them. Five and a half acres of land will barely suffice to furnish them with the various articles of food and liquor. Supposing the number of manufacturers and others connected in trade to amount to three millions, to support them in the manner they now live, would require an increase of land, which would (according to their former mode of life) have supported an additional population of four millions. We must also add, as further causes of the deficiency, the great increase of our naval and military force; the waste of every article of prime necessity in the families of the opulent, multiplied, out of number, by our commerce. These combined causes have all contributed to increase the demand for animal food, and consequently to operate, with other causes, in lessening the growth of grain. The increase of butcher's meat in country markets within fifty years is prodigious. Meat, that was provided only at particular seasons, is now weekly, if not daily, offered for sale.

The following Averages, computed at the Distance of 9 Years each, shew the Number of Cattle and Sheep sold in Smithfield:

	Of Cattle.	Of Sheep.
From the year 1732 to 1740, per ann. the average was	83,906	564,650
1741 — 1749, - -	74,194	559,892
1750 — 1758, - -	75,331	623,091
1759 — 1767, - -	83,432	615,328
1768 — 1776, - -	89,362	627,805
1777 — 1785, - -	99,285	687,588
1786 — 1794, - -	108,075	707,456

We are not informed of the average of the last seven years, but understand it considerably exceeds that of any former period.

The following is a Comparison between the average Weight of Bullocks or Oxen &c. 100 Years ago, and at the present Time:

	lbs.		lbs.
Oxen, 100 years ago, weighed -	370	now	800
Calves, - - - -	50	—	140
Sheep, - - - -	28	—	80
Lambs, - - - -	18	—	50

(Monthly Magazine, February, 1802, page 77.)

Smithfield market has (taking the increased weight of the carcases into calculation), doubled the weight of flesh sold within fifty years. If such has been the increase in the capital, where luxury ever predominated, what must be the increased consumption of meat throughout the whole empire?

The alteration of the corn laws in 1773 operated still further to decrease the quantity of corn grown, by creating a competition of foreign grain in our markets; and that at a time when the profits upon grazing were already greater than on growing corn.

Every burden, (which the necessity of the state has imposed since that period,) has been a direct tax upon the plough, and consequently operated as a bounty on turning land from tillage to grazing. The increasing demand for workmen, for our

manufactories, has united with other causes to enhance the price of labour, and operated as a further check upon agriculture.

The great acquisition, and general diffusion, of wealth has been the cause of multiplying the number of pleasure horses. The very improvements in agriculture have made a large proportional number of horses necessary, which has been further increased by the obligation of performing a great deal of work by horses; not only from the want of labourers in some districts, but also from the advance in the price of labour. The additional number of pleasure and agricultural horses has been the means of consuming the produce of a considerable portion of the best acres in the kingdom, and has had a powerful influence in diminishing the growth of bread corn.

I am confidently of opinion that a million and a half of acres might be spared from the pastures appropriated for the support of horses and cattle, and applied to the production of grain. In confirmation of this persuasion, I beg to state in the first place, what I conceive to be the quantity of land employed in the maintenance of the various descriptions of horses. By the returns to the tax office we are enabled to ascertain it with tolerable accuracy the number of horses in Great Britain.

The saving which might be made in feeding of cattle must rest upon conjecture, as we have no accurate criterion. The trials I have made justify the supposition of its admitting of very great retrenchment.

The number of horses that are entered and pay the duty amounts to 1,178,000, as appears from the returns of the tax office; and if we add those exempted as belonging to the army, &c. make allowance for the occasional evasion of the tax, we shall not much err in taking the total number at two hundred thousand: nine hundred thousand and upwards, of husbandry and draught horses are entered; and making the proper allowance for exemptions, and for such as may not have been returned, we may, I conceive, fairly estimate them at one million. — Suppose then

200,000 pleasure horses require	-	6 acres each, or	1,200,000
30,000 cavalry	- -	5 acres	150,000
1,000,000 husbandry and draught horses		4 acres -	4,000,000
200,000 colts, brood mares, &c.	-	3 acres -	600,000
horses 1,430,000			5,950,000 acres.

Of the six millions of acres employed in feeding horses of various descriptions, suppose it to be divided between pasture and grain, allowing 4 millions for hay and grass, and 2 millions for oats, I do conceive, upon a moderate estimate, a twentieth part might be spared by feeding draught horses upon potatoes, carrots, and straw, instead of hay, and soiling them in summer, which would make a saving of three hundred thousand acres.

If it be correct that there are twenty-four millions of acres in pasture, deducting four millions supposed to be required for horses, there would remain twenty millions for the pasturage of cattle, &c. Does it admit of much doubt, that (by feeding milch cows, and fattening cattle with green food both summer and winter, in sheds) a saving of a sixteenth part, or one million two hundred thousand acres might be made? Granting me that one million and a half of acres might be taken from the ground hitherto appropriated to the pasturage of horses and cattle, we may naturally suppose them to be those nearest to towns, and of the best quality; most advantageously situated for manure, and consequently capable of producing above the average of estimated crops. But should I be thought too sanguine in my calculations, as to the quantity of ground that might be obtained,—still with a less proportion (from the nature of the soil and advantages of situation, from heavier crops and a more frequent rotation of wheat being taken) the object might be accomplished: supposing one-fourth to be under wheat annually it would supply all our present demands. By an appropriation of a fourth to green crops, a larger quantity of food would be produced than was supplied by the whole whilst under pasture; the remaining 750,000 acres could be left for other crops, and might be managed in such a manner as would prepare the quantity of land requisite for wheat. I might also with propriety state the prodigious saving which would be made by the general use of the drill. Upon the farm (to which I have so frequently referred) there are 100 acres sown with the drill, with a Winchester and a half to the acre, whilst the common practice of the district is three Winchesters. This makes a saving of 150 Winchesters, the cost of which would have been, at the time, £75.

The expense of the mode of tillage I have practised and recommended is undoubtedly great, and its answering must doubtless depend upon grain keeping up its price. If wheat falls much below 10*s. per* bushel, I should despair of the profits being such as would repay the farmer.

The average price of wheat for the last ten years I have stated to have been at £3. 6*s*. per quarter, exclusive of bounties; had this been the price in the first five years of that period, I verily believe it would have proved such an encouragement to the growth of grain as would have prevented the necessity of our prodigious importations, (and in great measure) saved the nation forty millions, paid for the purchase of foreign grain in that period, and seven millions of bounties to the exchequer.

Taking six years from 1793, the average will be £2. 17*s*. 6*d*. and excluding the years 1795 and 1796, which were both failing crops, the average of the four remaining years will be £2. 10*s*. 8*d*. an advance of only fourteen shillings and eight pence in a space of little less than a century. But permit me to ask, is there *any* advance? According to Sir George Shuckburgh Evelyn's Tables of the Depreciation of Money,—in 1689, one pound had as great power over the necessaries of life as £2. 9*s*. 8¾*d*. had in 1800. If so, one pound sixteen shillings per quarter for wheat in 1700 would be equal in present money to £4. 8*s*. 8*d*. and this without estimating taxes, advance of labour, or other charges of cultivation.

What branch of commerce do we possess that is capable of producing a net gain of upwards of four millions and a half annually? Such, however, is the trade we appear to despise, notwithstanding a very considerable part of our national prosperity depends upon it.

I think little doubt can be entertained, by unprejudiced persons, of the advantage which must result from restoring a due balance between agriculture and commerce. That this can be effected without considerable difficulty I would by no means insinuate. We have the experience of the last half century of the benefits that resulted from it; and this justifies the wish that the experiment should again be made. The continuance of our national greatness and our commercial prosperity appear absolutely to depend upon it.

I very much question the policy of importation bounties on corn, as a general principle, however necessary under particular circumstances: the policy and wisdom of exportation bounties are ascertained by the experience of eighty years, and appear amongst the many proofs of the wisdom and sagacity of the legislature of those times.

Could the nation be fully apprised of the danger of our situation, and our growing

dependence on foreign countries for bread, and reflect on the difficulties we have so recently experienced, as well as the enormous drain of wealth that we have sustained in consequence of it, they would cheerfully concur in the re-establishment of that system, which not only procured abundance to the kingdom, but enabled it to export grain to the amount of six hundred thousand pounds annually; a sum little short of a million of our present money.

It is doubtless the interest of every member of the community to have grain cheap, and subject to as little fluctuation in price as possible. To have it of British growth appears the most rational way of accomplishing these desirable objects: but this cannot be looked for, or expected, unless the prices of grain be such as will enable it to be grown extensively, with a fair prospect of profit to the farmer.

The agricultural and commercial interests are so united that they must stand or fall together; to restore and maintain an equal balance between them appears most conducive to our national prosperity.

As a matter of speculation, I should contend, that the landed interest had ultimately more to apprehend, from the high prices of grain, than the manufacturer; and that any material fluctuation of price does more immediately affect its interest.

It must be allowed, that agricultural wages are regulated (in a great measure) by the price of the prime necessaries of life: the late high prices of grain advanced wages forty per cent. In the years of plenty which have succeeded, it has been found impracticable to reduce them; various other articles having also advanced, over which the fall of grain has no controul.

The labourer's scale of expence has kept pace with his wages, and he is as little able as ever to provide against any additional pressure; so that should an advance take place in grain above the standard of common years (and his employer refuse a still further increase of wages), his family must have recourse to parochial relief, which ultimately brings a heavy burden upon the landholder.

Manufactural wages have always been much higher than agricultural, and depend in some degree upon the flourishing state of trade. If the demands slacken, the manufacturer gets his work done at a lower rate rather than the hands should be out of employ, or obliged to seek other situations. The mechanic (earning considerably more wages) can bear a moderate advance upon the prime necessaries of life, either by the sacrifice of some superfluities, or by the extension of his hours of work.

Neither of these are in the power of the labourer; he has no resources; his confined means admit not of further retrenchment, nor is there any vacant time at his own disposal.

The manufacturer too has a free option whether or no he will continue his trade; if he cannot do it to advantage, he may withdraw his capital, and leave his men to be supported by the landed interest, who are bound to share the last farthing with them: they are in the situation of the mariner, they cannot quit the vessel, but must abide its fate.

I trust that, by the prudential and wise measures which have been adopted, the interests of agriculture will be promoted, and those of the manufacturer secured upon a more solid basis, than they were whilst they were suffered to depend on circumstances over which the nation could exercise no controul.

I trust the ardent interest I feel on this subject, does not so far mislead my judgment, as to induce me to conceive that practicable, which in fact is only visionary. On the contrary, I flatter myself, that my ideas of the advantages that would result from an extended system of agriculture, and feeding of horses and cattle upon green food and other crops both summer and winter, in order to lessen the necessity of employing so large a portion of our most productive lands in pasture, will have the sanction of those whose coincidence of opinion will give weight to the plan I have adopted. Allowing it were to fall short of the whole advantage I conceive it capable of producing, it may, nevertheless, be attended with much general as well as partial benefit. At all events, I hope you will excuse my having occupied so much of your time, by entering thus largely into the subject.

January, 1806.—In the experiments of the former year I had many difficulties to combat; great prejudice prevailed against the plan, and I was myself unacquainted with every thing relative to the dairy. By the pains and attention bestowed upon it, I trust I have gained such a knowledge of the subject, as to give the present trial a fairer prospect of success.

In the last year I was obliged to dispose of most of my heifers, having no preparation made to continue the keeping of them in summer, nor distant pastures where they might be grazed at a small expense, not exceeding forty or fifty shillings a head from May till October. There is a risk in heifers how they may milk, and they never give so much as after the second or third calf. Being now enabled

to keep such of the heifers as promise to milk well, a great risk is avoided, and the profits upon the same number of milch cows will be greatly increased without any additional expense. There is also a further advantage of having the stock more exactly in milk at the period required.

In all extensive corn farms there is not only a large quantity of chaff, but much refuse corn seldom used, except for poultry: these mixed and steamed make admirable feeding for cows, greatly promote their milking, and can scarcely be considered of other cost beyond the preparation. When I had no refuse corn, I made use of a small quantity of bran. I tried many experiments to dissolve oil cake by boiling, but I could not succeed. I am now about erecting a mill to grind it, in order to dissolve and mix it with the chaff. I have no doubt of being able by this means to make a great saving; I expect half what I now give will answer every purpose. The period fixed for the delivery of this report will prevent my being able to ascertain this, or to state the ultimate result of the produce of my green crop. Since the beginning of November I have received from ten to eleven guineas per week for milk, and expect it will continue to produce that, or more, for two months to come. Should the Board at any future period require further information, I shall be happy to afford it.

On the 1st of October I recommenced my dairy, the preparation for it, of green food, was as follows:

Eight acres of cabbages,
Ten acres of red turnips,
Two acres of Swedish,
One acre of kohlrabi,
Twelve of cole-seed.

The cabbages were delayed planting (from the extreme dryness of the season), till the beginning of May, which was a full month later than my usual time. They have proved the lightest crop I ever had, which confirms my predilection for early planting. They stood till the last week in January. The stripping them of decayed leaves requires a great deal of labour. The drum-head cabbage was what I planted; a hardier kind would answer better for standing the winter. I should be much inclined to try some of the Scotch coles, which, by proper care, might, I suppose, be increased to a large size, and would stand late. The turnips proved a very admirable crop. Agreeably to my former intention I made several trials to

ascertain the weight of an acre of drilled turnips: I weighed various plots of ten yards square, in different parts of the field, and found their several weights (differing very little) gave about 108 stone each, which is 32 tons and upwards per acre. There are many crops in the neighbourhood equally weighty, though none, perhaps, quite so clean. They succeeded wheat, and had about twenty carts per acre of ashes and street-rakings. They were sown in stitches, three feet asunder; the whole was worked from July till the end of September with the double mould-board plough and potatoe harrow, alternately taking the soil from the turnips and returning it to them. The stitches were besides twice hand-weeded and thinned. This mode of cultivation is attended with considerable expense, but I conceive it to be amply repaid both in the present and future crops.

Thirty-two tons per acre, at a farthing per stone, brings them to £5. 6*s*. 6*d*. The estimate of £10. an acre is moderate, as the turnips cost at that rate under a halfpenny per stone, which is but a fourth of the price of straw. The expence of pulling and carting is doubtless heavy; but, in strong lands, and where much wet falls, I conceive it impossible to attempt eating them off the ground with advantage: even where there is a pasture adjoining for the sheep to lie, the constant passing through the mire injures them so much as to prevent them fattening; at least I have found it so after many trials; but I speak of mountain sheep, having no experience of any other. The Swedish turnips were very good. The kohlrabi got to about five pounds each, the white were the largest, the purple the hardiest. Cattle and sheep are particularly fond of them; but I see no advantage they have over the Swedish, except that they may be got at in frost. The cole-seed was delayed sowing from the wet; and very cold weather succeeding prevented its making much progress. It may advance in spring, but to those who want it sooner it is a failing crop. My stock consists of 22 heifers, 8 cows, which were in milk during summer, and give but little milk in October, 4 spring calvers, 10 head of young cattle, and 3 bulls, and 4 fattening; total shedded 51: 50 Highland heifers and 150 sheep; part of the Highland heifers and sheep I have disposed of, which reduced my stock, at the commencement of the year, to 40 Highlanders and 120 sheep.

The cows were not in general milk till the beginning of November, when the milk obtained exceeded 50 gallons per day; 30 and upwards in a morning, and 20 in an evening. 160 Quarts of new milk and 40 of skimmed were sold to the

town, mornings and evenings, requiring less than two hours to dispose of it at each part of the day.

The plan of feeding was considerably varied from the former year. Immediately after morning's milking a stone of steamed chaff, which had been prepared the night before, and was now sufficiently cold, was given to each cow. After this followed three pounds of oil-cake. They were then turned out to water; on returning to their sheds they had green food. Previous to evening's milking a second feed of chaff, after it a further feed of green food, and at six o'clock a foddering of 6 or 8 pounds of straw.

Calculation of expense.—In estimating the cost of feeding, I shall take the whole at 6*d.* per day:

Stone.	*lb.*		*d.*
2	0	Of green food - -	$0\frac{1}{2}$
2	0	Of chaff, &c. - -	2
0	3	Of oil-cake - - -	3
0	8	Of straw - - -	1
4	11	each.	$6\frac{1}{2}$

Cows which gave but little milk, and had no prospect of being improved:

	d.
3 Stone of green food - -	$0\frac{3}{4}$
2 Stone of chaff - - -	2
Straw 8 *lb.* - - -	1
	$3\frac{3}{4}$

As soon as I can accomplish bruising the oil-cake, I expect a pound and a half, or two pounds at most, will be amply sufficient, which will reduce the expense to five-pence per day. Upon an average I had, in milk, about 28 cows. They gave, (with the exception of those which had been in milk during summer) above eight quarts wine measure per day. The state of the atmosphere produced a verp considerable alteration in their milking. I have known it vary two gallons a meal. I estimate the profit which might fairly be expected from each cow, as follows:

	£.	s.	d.
220 Days, at 6*d.* -	5	10	0
Attendance - -	2	0	0
Loss, risk, &c. &c. -	3	0	0
£.	10	10	0

	£.	s.	d.
8 Quarts of milk for 220 days, 2*d.* per quart -	14	13	4
33 Carts of manure -	1	13	0
Calf - -	2	0	0
	18	6	4
Cost -	10	10	0
Clear gain £.	7	16	4

Supposing, instead of heifers, that the dairy was stocked with cows of the second and third calf, and the expence of keeping each estimated at sixpence, I think 10 wine quarts might reasonably be expected for 220 days, at the two meals.

	£.	s.	d.
220 Days feeding -	5	10	0
Attendance - -	2	0	0
Risk and expence, say -	4	0	0
£.	11	10	0

	£.	s.	d.
10 Quarts of milk for 220 days	17	12	0
Manure - -	1	13	0
Calf - - -	2	0	0
	21	5	0
Expence -	11	10	0
Clear gain £.	9	15	0

I think this profit will not be over-estimated, but may fairly be looked for. The quantity of straw consumed for fodder, &c. has so far exhausted my stock, as to oblige me to adopt expedients for bedding both cattle and horses. The substitute I have had recourse to is sea-sand, which I can obtain within a mile. I use it so as to absorb all the urine, and expect it will be a very valuable manure for strong ground. I use a thin covering of straw over it for horses.

Expence of steaming chaff for a week, is as follows:

	s.	d.
A woman, who attends the fires and sells the milk, at 12*d.* per day, supposing her labour to be divided between the two - - -	3	6
Half a hundred weight of coals per day, 3*d.* - - -	1	9
	5	3

	s.	d.
100 Stone per day, 1*d.* per stone - - -	8	4
Expences - - - - - -	5	3
Clear gain -	3	1

I have obtained an account of an experiment made last year by a very accurate friend of mine, of the feeding of four milch cows for 204 days, where hay in part was given:

	£.	s.	d.
896 Stone of hay consumed by the four milch cows in 204 days, cost, at 6*d.* per stone - - - - -	22	8	0
10 Winchester bushels of ground oats, at 4*s.* - -	2	0	0
64 Bushels of bran, at 13*d.* - - - -	3	6	8
48 Stone of carrots, at 6*d* per stone - - -	1	4	0
Half an acre of cole-seed - - - -	2	10	0
Attendance - - - - - -	8	0	0
	39	8	8

	£.	s.	d.		£.	s.	d.
By milk, &c. sold	54	8	0	Profit by milch cows -	27	19	4
Manure -	5	0	0				
Four calves -	8	0	0	Risk and depreciation in value, £3. per head - -	12	0	0
	£.67	8	0	Clear gain -	£.15	19	4

This gives a profit, within a fraction, of £4. each. Each cow appears to have given 8 quarts of milk per day, wine measure.

Cost of feeding, without attendance, is $9\frac{1}{4}$*d.* per day.

The Quantity of Food given to each Beast, was:

	St.	lb.
Hay - -	1	6
Green food -	2	0
Ground oats -	0	4
	3	10

Experiments in making of Butter from the above Milch Cows:

	s.	*d.*
48½ Quarts, wine measure, taken from the produce of the whole milk, yielded 3*lb.* 1*oz.* of butter, which at 12*d.* per *lb.* - -	3	1
42¼ Quarts of blown milk, 1*d.* per quart - - -	3	6¼
4 Quarts of butter milk, 1*d.* ditto - - - -	0	4
	6	11¼
48½ New milk, 2*d.* per quart - - - -	8	2
Loss by butter, at 12*d* per *lb.* -	1	2¾

By this experiment 16 quarts of milk were nearly required to a pound of butter. The Agricultural Report for Lancashire gives 18 quarts as the average quantity of milk for making a pound of butter from the hand churn, and 15 with the horse.

The following experiments were made under the immediate inspection of my bailiff, as I was doubtful of the accuracy of my own dairy, which stated a pound of butter to eight quarts of strippings: to reconcile so great a difference, the large proportion of heifer's milk, which is much richer than cows of the second or third calf, must be allowed as contributing something. The oil-cake, I have no doubt, is the principal cause of the surprising difference. The butter was made with a pendulum churn of Mr. M'Dougall's, which answers admirably well, and saves much labour.

	s.	*d.*
48 Quarts 3 pints of strippings, gave of butter 6*lb.* at 12*d.* -	6	0
38 Quarts of blown milk, 1*d.* - - - - -	3	2
7 Quarts of butter milk, 1*d.* - - - -	0	7
	9	9
48 Quarts and 3 pints of new milk, at 2*d.* per quart - -	8	3
Gain by butter -	1	6

48 Quarts 3 Pints of a Mixture of Milk.

	s.	*d.*
48 Quarts 3 pints yielded 5*lb.* 3*oz.* of butter, at 12*d.* -	5	2
36 Quarts of blown milk - - - -	3	0
10 Quarts of butter milk, 1*d.* - - -	0	10
	9	0
48 Quarts and 3 pints new milk - - -	8	3
Which leaving a profit by butter of -	0	9

The advantage of oil-cake, in making butter, appears very considerable. Eight quarts of strippings give a pound of butter; and nine and a half of a mixture of the whole milk. In the Transactions of the Bath Society, Vol. IV. I see that 12*lb.* are stated to give a pound of butter. Wine measure is used in all the experiments.

I have thus, with the most exact attention to accuracy in my power, endeavoured to detail the experiments I have made in the last two years. The individual benefit reaped from it will be most satisfactorily proved by the certificates which accompany this. The numerous signatures bear ample testimony of its utility; and indeed when it is considered that butcher's meat is at 6*d.* per pound, and that good and nutritious milk can be obtained at 1*d.* per pound, (less than the price of bread) its advantages cannot be doubted. The health and condition of the cattle are certified for by all the farmers in the neighbourhood, and will, I am confident, be agreed to by those who have seen them.

I rejoice sincerely at the appearance of profit of the present year: it answers my most sanguine expectations, and confirms the opinion I formerly entertained, not only of the practicability of furnishing a plentiful supply of milk during winter, but also with a profit not unworthy the attention of any farmer. I trust that what I have done may stimulate others, and that the result will be equally successful, and prove a great acquisition of comfort to the lower orders.

The following estimate of expence and profit will rather fall short, than exceed, what may fairly be expected. In this I am confirmed by the opinion of those who were employed in conducting the experiment.

Value of Green Crop in 1805, Oil-Cake, and Attendance:

	£.	s.	d.
33 Acres of green crop at £5. per acre	165	0	0
10 Tons of oil-cake, at £10. per ton	100	0	0
Attendance	145	0	0
Chaff and straw	50	0	0
Total expenses of green crop, oil-cake, &c.	460	0	0
To which may be added, for risk, capital, &c.	108	0	0
	£.568	0	0

Expense of keeping Milch Cows for 220 Days; to which Period *the Green Crop* is calculated to last:

	£.	s.	d.
30 Milch cows for 220 days, at 6*d.** per day each	165	0	0
Attendance	60	0	0
Risk, &c. &c.	90	0	0
	£.315	0	0

The *Produce of Milk*, &c.

By 180 quarts of milk for 220 days	330	0	0
By calves sold	50	0	0
1000 Carts of manure from the proportion of sand, valued at 1*s.*	50	0	0
	430	0	0
Expence of feeding, &c.	315	0	0
Clear profit	£.115	0	0

The average quantity of milk for each cow, 6 quarts; this is owing to the summer calvers, which are included in the stock: 8 quarts may be estimated on a moderate computation; this would have added 5*s.* per day, or £55. upon the whole period. A well selected dairy might reach 10 quarts, which would make an addition of £100. The next year I expect to have a better set, and do not fear making £200. by the same number. November is as early as a winter dairy should begin; till that

* 6*d.* Is charged, as some had no oil-cake, and cost only $3\frac{3}{4}$*d.* per day.

period milk can be had from pasture, and is neither of the service nor value at a later period.

Profit upon remaining Stock:

	£.	s.	d.
50 Highlanders, at £4. each	200	0	0
17 Young cattle and others, valued at £6. each	102	0	0
150 Sheep, at 10s. each	75	0	0
4 Cows, fattening, at £12. 10s. each	50	0	0
600 Carts of manure, at 1s.	30	0	0
	457	0	0
Expense of feeding, &c.	253	0	0
Profit	£.204	0	0

Profit by milk	115	0	0
By stock	204	0	0
Total	£.319	0	0

There was sold on the last day of January 22,000 quarts and upwards of new milk, which averages 183 quarts per day; in the last month upwards of 200 quarts per day, and may continue without much diminution for six weeks. I do expect the quantity of milk will exceed the estimate. Something, however, depends upon the state of the weather. I weighed some of the kohlrabi: I had white that weighed seven pounds and a half, with little or no top; and the purple five and a half. I think they would average five pounds.

I have now fulfilled to the best of my power the different statements connected with the experiment, and trust in the indulgence of your Lordship and the Board for any unintentional errors I may have committed. By delaying another year I might have made great improvements in my plan of feeding, and have produced a more flattering result. I am unwilling, however, to delay the communication. The profit is sufficient to encourage others, better qualified than I can pretend to be, to prosecute the plan from which so much benefit will accrue to the public at large.

I remain, &c. &c.

February 1, 1806.

THREE months have now elapsed since I had the honour of submitting to the Board a detailed account of my experiments in the feeding of milch cows, and as the period of 220 days, upon which the calculation was found, is also completed, I beg leave to add the subsequent proceedings, and the improvements in some particulars, which I have been able to effect. Having erected an apparatus for grinding of oil-cake, I have been enabled, for the last two months, to make a saving of one pound per day, in the feeding of each milch cow; and I find, that, when ground and boiled with caff, it has been more productive, and increased the quantity of milk.

The expence is now reduced to $5\frac{1}{2}d.$ per day for each cow.

	d.
Two stone of green food - - - -	$0\frac{1}{2}$
Two stone of chaff boiled - - - -	2
Two pounds of oil-cake - - - -	2
From six to eight pounds of straw - - -	1
	$5\frac{1}{2}$

The quantity of milk up to the 20th of April, when eleven of the worst of the cows were sold, exceeded 180 quarts per day, which was beyond my expectation.

Forty thousand quarts and upwards of new milk have been sold up to the 1st of May.

	£.	*s.*	*d.*
The actual receipts for milk amount to somewhat above	360	0	0
Calves - - - - -	54	0	0
Manure, much undervalued at 1*s.* 6*d.* - -	50	0	0
	£.464	0	0

	£.	*s.*	*d.*
The expence, at the present actual cost of $5\frac{1}{2}d.$ per head, on 30 milch cows, for 220 days, will amount to - - -	151	0	0
Attendance - - - - - -	60	0	0
Loss upon 11 of the worst cows already sold, at £2. 10*s.* each -	27	10	0
Probable loss on the remaining 19 cows, estimated at £2. each -	38	10	0
	£.276	10	0

Which leaves a balance of profit (on the supposition of the present expense of feeding) of £187. 10*s.* or £6. per head on each milch cow.

On beginning to feed with cole-seed, I found an almost immediate increase in the quantity of milk, and I cannot too strongly recommend it, as well for this object, as for its superior advantage over all other green crops in point of duration. What I sowed in August is still in use, and will, I confidently expect, serve through the whole of this present month.

The milk sold from 19 cows in the last two fortnights ending the last week in May, amounted to £21. 3*s.* 8*d.* or £181. 3*s.* 8*d.*; in the second fortnight £21. 10*d.* or 181 quarts per day; and a considerable profit will still accrue before they will be entirely deprived of their milk.

The enlightened and humane attention of the Board has been directed in an especial manner, to encourage the appropriation of small allotments of ground to cottagers, for the purpose of enabling them to keep a cow; yet, great as this benefit undoubtedly is, how small is the number that can profit by it, when compared with the lower class of inhabitants in towns! and I humbly conceive, that it is in the power of those who hold large farms to sell new milk, with a large profit to themselves, on cheaper terms than the cottager can procure it, and especially during the winter months.

I cannot too earnestly call the attention of landed proprietors to the advantages that would result from their requiring their farmers to supply a certain quantity of milk at a fair price for the support of the poor in their respective vicinities, at all events of those families who are employed in the cultivation of their own farms. And though the resulting profit may be of comparatively small importance in the scale of their annual gains, yet, as an act of benevolence, an attention to the interest of the most valuable class of men, it is an object highly worthy of consideration. Nor is its importance limited solely to the preservation of lives of a number of children, and the increase of comforts to the labouring classes of society. Compared with the other prime necessaries of life, milk is not only the most nutritious, but the cheapest article of subsistence, that can be produced for the support of man. To prove this fact, we will compare its price with that of bread, and then with the average cost of butcher's meat. And, first, it appears, that bread, which is now at 3*d.* per pound, has not been sold lower than $2\frac{1}{2}d.$ during any part of the winter; whereas milk, at 2*d.* per quart, or 1*d.* per pound, is exactly one-third the

price of bread. Compared with butcher's meat it is one-sixth; and as a beverage and substitute for malt liquor, I conceive it to be a fourth; and it is certainly better adapted to the labourer than any other liquor, from its being of a slower digestion.

Viewing it as it concerns the public, milk affords the largest supply of victual from the least consumption of food. A great proportion of the food, which is so admirably adapted for producing milk, is not applicable to the feeding of fat cattle.

I conceive that the food necessary for a cow in full milking will not exceed one-third of what is requisite in feeding for the butcher, but it is in weight as 3 to 1; but allowing the difference in the quantity of food to be less than what I have taken it at, a milch cow, nine months or 270 days in milk, at 10 quarts in the two meals, would give 2700 quarts, or 5400 pounds weight of milk. Were the same animal fattened to 30 stone (of 8lb. per stone) a quarter, with an allowance of five quarters for the carcase and fat, the whole weight would be only 1200 pounds; and would be to milk only in the proportion of 1 to 4.

Supposing the average produce of each acre of wheat to be 24 Winchester bushels, at 60lb. per bushel; the actual nourishment derived from one bushel will be 37lb. of first flour and 14 of two inferior sorts, $8\frac{1}{2}$lb. of bran, allowing half a pound for waste, making in the whole 60lb. or 1224lb. of flour per acre; so that it would require four acres to give the weight of flour equal to the weight of milk given by a single cow in 9 months.*

The advantages of a supply of milk for the use of the lower orders is great in every point of view; and, I trust, the discussion of the subject, and the bringing of it before the public, may be the means of extending the benefits which I have

* To show the gain of victual to the public, when compared with bread, the article of first necessity, we will state the total product of milk up to the last week in May, when the 30 cows had yielded forty-five thousand quarts of milk, equal in weight to ninety thousand pounds. The green food consumed, (oil-cake and chaff not taken into the calculation), supposing twenty tons to be the average of green crop per acre, would be less than four acres, but say five. Twelve hundred and twenty-four pounds being the product of an acre of wheat when made into bread. It would require seventy-three acres of wheat to yield ninety thousand pounds of bread. Thus sixty-eight acres are gained for other purposes upon a comparative scale between the product of milk and bread.

had the satisfaction, for these two years past, of introducing among the poor of my own neighbourhood.

May 25, 1806.

P. S. By adverting to the quantity of milk given in the month of May, with only 19 milch cows, it will clearly appear how much greater the profit would have been upon a well selected stock.

No. VI.

An Account of the Improvement of more than 90 *Acres of Lands, lying waste. By Mr.* Philipps, *of Tyn-y-Shos, near Oswestry.*

In the year 1804 a large quantity of waste land was divided and allotted in the township where I live, on the borders of North Wales, by private agreement. I became possessed, as proprietor, of 70 acres of these lands. I obtained 50 acres more by two leases, each for 21 years, and 25 acres in exchange for other lands.

The wastes consisted of two divisions: the first was a piece of common land, surrounded by old inclosures. This portion, though raised far above the general level of the country, is much less elevated than the larger tract, hereafter to be described.

The portion of this waste allotted to me was eight acres. The grass produced, while the land was in its natural state, was a sour rough sort. It afforded pasture in the summer to a few cattle, horses, and sheep. The coldness of the soil, and the consequent bad quality of the grass, gave this common the Welsh name of Rhôs; a name which implies a tract of moist land, producing a coarse sour herbage.

1. I began my improvements upon this allotment, because it lay near my house.

The fence is a ditch four feet high, with a double rail at the top. A double row of quick is planted upon the top of the ditch, to supply the place of the rails when they decay.

The surface soil is about six inches deep, with a substratum of bad yellow clay. The first ploughing was in June 1804; it was cross ploughed in August, and harrowed; ploughed a third time about the 20th of September; manured about the end of the same month with 1690 Winchester bushels of lime, amounting to about 211 bushels an acre: ploughed a fourth time in the middle of October, in small butts or ridges, sowed and harrowed. This operation of ridging was peculiarly necessary here to carry off the surface water, which had formerly greatly injured the land. Twenty-four bushels of Devonshire wheat were sown. The return was about 240 bushels; 30 bushels an acre. The crop was one of the finest in this country.

The expences, as appears by the subjoined Table, were £88. 19*s.* 1*d.* The wheat was worth, last month, £130. The balance in my favour is £40. 0*s.* 11*d.* £5. 2*s.* 7*d.* an acre. This land, in its natural state, was not worth five shillings an acre; when it is laid down in grass it will be worth forty shillings an acre.

In the beginning of October, 1805, the stubble was harrowed off and conveyed to the farm-yard. The land was then ploughed, sowed with twenty-four bushels of wheat, and harrowed, as the year before. This is not my usual course of crops; but it was thought that old common land could not easily be exhausted; and I was tempted to take another crop of wheat by the high price of corn, and by the circumstance of the land being for four years tithe free. The corn now, the 12th of January, is coming up in abundance.

It is my intention to lay down this lot with grass-seeds, to be sown with oats in the spring of 1807. Oats I conceive to be the best grain for the next crop, because the land is not dry enough for turnips and barley.

The second, and much larger, division of lands lying waste, extended along the side and reached the summit of a hill, which is equal in height to any in the county. The aspect is for the most part north and north-east. A mountain torrent runs through the midst of this tract. Some of the lands on one side of this torrent are more sheltered, and have a southern aspect.

Lime-stone is found on the lowest part of this waste, not far from the bed of a river; but the steepness of the ground above would have been too formidable an obstacle to the cultivation of the higher lands, had not lime-stone been discovered upon a spot so elevated as to enable the improver to convey his manure, at a comparatively light expence, upon the lands below.

The coals, indeed, for burning the lime, are brought up a steep hill a distance of four miles. This enhances considerably the expence of the manure.

Upon this waste the lime-stone is at the bottom of the hill, and fortunately also at the top. The substratum at no great distance from the surface is sand-stone, in some places hard, in others more rotten, and less useful for fencing; a purpose to which I have applied it in dividing most of the inclosures.

Here let me premise, that all the waste lands allotted to me as proprietor, or occupied by me as tenant, in consequence of the two leases mentioned above, were covered, for the most part, with gorse, *Ulex europæus*, in some parts of England called furze. Some more favourable spots produced fern alone; and others were

much encumbered with stones. The stones were carted off the lands to assist in making the fences; and those which were too small for this purpose, were used to fill up large holes in various parts of the land.

The thin soil upon these wastes seems to have been created by the annual decay of portions of the gorse; a plant admirably calculated to produce, and afterwards to detain, in spite of rains and storms, the vegetable earth upon these steep declivities. Around each bush of gorse is always found a heap, more or less high, of excellent soil. And so completely do the prickles of this plant defend the grasses that grow among it from the attacks of sheep, that the earth produced by the successive decay of vegetable matter constantly accumulates, and renders land, which a few centuries ago would probably have been unproductive, proper for the growth of corn.

It is impossible to traverse our mountains without observing how wisely these things are contrived by Him who provides for us all. The highest mountains of North Wales, where the rock does not every where appear, are clothed with heath. As ages roll by, the soil produced by the annual decay of portions of the heath becomes fit to produce gorse. If the water has a ready fall, and the land is dry, gorse appears in abundance on the more exposed sides of the mountains. Where soil has accumulated in sufficient quantities, the next protector and fertilizer of the mountains is fern. Wherever this plant flourishes, still richer quantities of vegetable earth are every year added to the surface soil; and the ground is rapidly prepared for the plough. Let me be excused for having made this digression longer than I intended.

I now proceed to state the operations performed upon the second portion of waste lands improved by me.

2. One close of 21 acres, of which I have a lease for 21 years, at ten shillings an acre, is so steep that no waggon or cart can be used to carry off the crop. Drags must be employed for this purpose. This land was so steep, and was encumbered with such a quantity of stones, that a respectable gentleman farmer, whose lands are contiguous to it, and to whom it was offered in exchange for other lands, declared he would not cultivate it if it were given him as a present. I should observe, that it was stipulated in my lease that the landlord was to be at the whole expence of fencing.

The greater part of this lot was begun to be ploughed for me in December 1804,

by a neighbouring farmer, at 20*s.* an acre. It was at first ploughed one way. The steepness of the ground made it necessary for the horses to drag the unencumbered plough to begin the furrow again upon the "vantage ground." Two acres of it could not at first be ploughed at all. Hand labour was here employed. The difficulty of ploughing proved so great, that I thought it right to make some addition to the stipulated price of 20*s.* an acre. It was harrowed in June. The whole of the field was cross-ploughed in July; harrowed, and manured in August with 5200 bushels of lime; about 250 buhels an acre. The quantity of lime generally used in this country is about one-fourth less than this. The lime was carted in small quantities and laid upon the land, with the assistance of three men with each team. So many men were necessary on account of the unevenness of the ground.

The fence, made at my landlord's expence, consists of a wall 6 feet high, 20 inches broad at the base, and 14 at the top: it is to be pointed next summer with mortar. The materials were partly stones collected in the field, and partly sand-stone obtained from a quarry opened for the purpose in an allotment to be described hereafter. The fencing is mentioned in this place, because it was in this part of the process that the stones were collected off the land. It was ploughed a third time the first week in October, sowed with wheat, and harrowed. Three ploughings were thought sufficient for the land, because the soil is light and ragged. The depth of soil is here near eight inches; the substratum is a light yellow rammel, called in this country cat-brain: the sand-stone, which lies next below, does not appear near the surface, except in one small part of this field.

The wheat sown was 71 bushels, about 3 bushels an acre: this large quantity of seed was thought necessary, on account of the lightness of the soil, and the exposed northern aspect. The plants now, 12th of January, look healthy; they are of a good colour, and equal in appearance, and promise of a good crop, to the wheats upon the best lands in the neighbourhood.

3. I obtained a like lease for 21 years of another lot of 12 acres from the same landlord, at 10*s.* an acre. I may here remark, that by an error in laying out a road, nine acres and a half of this field belong to my landlord, the other part belongs to me as proprietor; but the close is at present undivided, and all subject to the same management. The aspect is here south-east, but the situation is much higher than that of the last-mentioned lot.

This lot, like the last, was, by the terms of my lease, to be fenced by the landlord; but all the fences have been made under my superintendance. The whole fence here would have been a wall, but the sand stone rock on this part of the hill, failed. Twenty-six roods are fenced with a stone wall, six feet high. Sixty-seven roods are a ditch, faced on one side with stone, and protected above by posts and double rails. Upon the top of the ditch hawthorn quick is set. Fifty-eight roods more, which complete the inclosure, is bounded by a very high old dyke. This boundary, however, is of such a sloping form, that some additional defence was necessary: a ditch is therefore sunk on the summit of the dyke, to the depth of five feet; in this are planted strong staggers, as they are here called, consisting of hazle, holly, thorns, and horse-briers.*

The first ploughing was in February, 1805. It was done by my own teams; we used four horses in each team. I will remark here, by the way, that my own teams ploughed, the first time over, all the lands which I have improved, except the last-mentioned lot of 21 acres; and that the expence for oats only, given to my horses the first nine months of my improvements, was seventy pounds. This lot was harrowed the beginning of June. The second ploughing was in July, by hired teams. It was harrowed the second time in the beginning of September; limed with 3250 bushels of lime, allowing about 270 bushels to each acre. It was sowed, in the middle of October, with 40 bushels of wheat, and harrowed. The wheat plants are come up in abundance, and look as healthy and promising as upon any lands in the county.

It has already been remarked, that upon these light loose soils, it is necessary to sow a larger than usual quantity of seed by the acre. The soil is here about nine inches deep, but remarkably loose and light. The substratum, above the sand rock, is the same rammel or cat-brain which is found under most of these wastes.

4. I obtained from another landlord a lease for 21 years, of two other allotments, amounting together to 20 acres. By the terms of my lease, I am to pay no rent for the first seven years; for the remaining 14 years, the rent is to be 14*s.* an acre. The tenant is to make the fences at his own expence.

Sixty roods of the fence round the first of these two lots, which consists of 12 acres, is a stone wall of six feet high. Thirty roods, a strong ditch, faced, as in the

* So called, perhaps, because they are an excellent fence, when mixt with other underwood, against horses, as well as sheep, and other animals.

last lot, with stone, and protected above with posts and a single rail. On the summit of the ditch hawthorn quick is planted. A single rail was here thought sufficient, because it is a fence between two closes, not between a close and the road.

The first ploughing was in September, 1804. This was the first lot, after the Rhôs above-mentioned, upon which I employed my own teams. It was harrowed early in May, 1805; cross-ploughed in the beginning of June; harrowed immediately; limed in the same month with 3250 bushels of lime, the same quantity as in the last-mentioned lot; ploughed a third time, and sowed in the end of October, and harrowed. The quantity of wheat sowed, as in the last lot, was 40 bushels. The soil is here partly sand, upon the sand rock, and partly a light soil upon rammel. Hand labour was employed, at a great expence, upon a stony part of this lot, in quantity about three acres. The wheat plants upon this lot are of as promising an appearance as upon either of those above described.

5. The other lot of eight acres, obtained by the last-mentioned lease, is not yet inclosed. The labourers are now, 13th January, employed upon the fence. It was ploughed in January, 1805, and harrowed in the same month. It is now a fallow intended for pease.

This lot would have been prepared for wheat, and sowed, but lime in sufficient quantities for all my improvemements, could not this year be obtained at the only rock from which lime could be conveyed, at any reasonable expence, to the lands.

I was induced to offer the rents above stated, of 10*s.* and 14*s.* an acre, (in the last case the land to be for seven years rent free) because I was confident that these wastes were capable of improvement; but in the natural state, in which I found them, they were not worth 2*s.* an acre. They afforded pasture to a few half-starved sheep of the worst Welsh breed; and the sheep did more damage to the fences of the old inclosed lands, in winter, and to the lands themselves, than could be compensated for by the profits which their owners derived from them. The closes now fenced and improved are well worth a guinea an acre; a year ago they were not worth two shillings.

The improvements upon the four first lots above described are, to a certain degree, complete. They contain 53 acres of as fine green wheat as any which this country contains.

6. A sixth close of 32 acres, allotted to me, as proprietor, is fenced with a wall

six feet high, and 110 roods in length: most part of the wall is pointed with mortar on the outside; the rest is to be pointed next summer. The lower part of this allotment is bounded by the fences of my old inclosed lands: on the exposed side, towards the NW, a plantation is intended, fifty roods in length, and twelve yards deep.

This close was almost entirely covered with gorse. There was, as I stated above, much of this plant upon the lands already described. My first operation was to stock up the gorse; I gave my labourers three guineas for this work, upon this lot only; they were also to have the gorse for their own use, which was partly used for fuel and partly sold by them. They sold it at five shillings the cart load.

I made an experiment upon five acres of this close, where a plough could not at first be used. After the gorse was stocked off, it was pared and burned, and the ashes were spread.

The plough could, after the land had been thus treated, though with some difficulty, be used. I ploughed it in June, 1805; harrowed it; ploughed it three times more; and sowed it, about the end of the same month, with turnip seed. There is now (Jan. 13), upon the land a fair average crop of turnips.

I also pared three acres more; part of this was burned, and part was manured with dung. Where the dung was laid, the ground was trenched about nine inches deep; the sod was placed with the surface downwards, within the trench; the dung was laid in moderate quantities upon the sod, and covered with about six inches of soil. Potatoes were then set, in the beginning of May, in rows; they were hoed twice: the produce was abundant.

The remaining twenty-four acres of this inclosure were ploughed in February and March, 1805. Fourteen acres were, after one ploughing, sowed with 71 bushels of black oats, eight acres with pease, and two acres with summer vetches. The ground was then well harrowed.

I had little land, of my own inclosures, this year, in oats. It was my wish to try whether a crop of this grain might be obtained upon land so fresh and light as this, without manure, and with one ploughing. The first promise, however, of the oats was so bad, when they began to appear through the ground, that I thought it best to throw some lime upon the land, which, if not so beneficial to the crop of oats, would be useful to any succeeding crop. I therefore manured 18 acres, viz.

all the land where the oats were sown, and part of that sown with pease, with 4550 bushels of lime.

I obtained from the 71 bushels of oats a return of 360 bushels; a clean thin crop, intermixed, indeed, with a little fern. The pease and vetches produced but a poor return.

In the beginning of November my teams were not much employed; I sent them to try how this land would appear when ploughed up. I found the part that had been limed remarkably mellow. I conceive this favourable appearance arose from the long time that the lime had been upon the ground. I then procured several hired teams, in addition to my own. It was all ploughed by the 20th of the same month, sowed with 95 bushels of wheat, and harrowed.

The potatoe land was sowed with wheat at the same time. The six acres that had not been limed are to be manured with 190 bushels of soot. The soot is now in waggons upon the ground; and the first favourable day it will be thrown upon the land as a top dressing.

This is the last field sowed by me. The wheat plants are now, the 13th of January, making their appearance through the ground, and look well.

I intend to proceed with activity in the improvement of the following allotments, which still lie waste:

7 and 8. One of these lots, of 25 acres, I obtained in exchange for four acres and a half of old enclosed arable land, detached from my farm, of much the same quality with the other arable lands in this neighbourhood. This circumstance alone proves of how little value these waste lands are; for these twenty-five acres were an object to me, as they lay contiguous to another of my allotments; and they are equal, in goodness of soil, to any upon this hill. After this land has undergone the process described in lots 2 and 3, I hope to see these twenty-five acres of equal value, acre by acre, to the $4\frac{1}{2}$ which I gave for them.

These 25 acres, as well as lot 8, 27 acres, allotted to me, as proprietor, will be improved next summer.

9. Three acres of steep ground, that can never be cultivated, will be planted, this spring, with different kind of forest trees.

The tables of expenditure are below. The return in the first lot has more than repaid all my expences the first year; and the return promised by the three succeeding lots is little less abundant.

If I am permitted to live another year, and to enjoy my usual health, I hope to see 145 acres of land, which was so lately almost entirely unproductive, covered with golden harvests, or adorned with thriving plantations.

1804.	*1st Lot*, 8 *Acres.*		
Sixty-four roods of fencing, at 7*s.* per rood	£.	22	8 0
One gate and posts		1	1 0
First ploughing, at 20*s.* per acre		8	0 0
Second ditto, at 15*s.*		6	0 0
Third ditto, at 10*s.*		4	0 0
Fourth ditto, at 10*s.*		4	0 0
Three separate harrowings, at 5*s.* per acre each harrowing		6	0 0
One thousand six hundred and ninety Winchester bushels of lime, at 2½d. per bushel		17	12 1
Carriage		5	4 0
Twenty-four Winchester bushels of wheat, at 11*s.* per bushel		13	4 0
To labour		1	10 0
1805.			
One ploughing, at 10*s.* per acre		4	0 0
One harrowing, at 5*s.* per acre		2	0 0
Twenty-four Winchester bushels of wheat, at 11*s.* per bushel		13	4 0

2d Lot, 21 *Acres, fenced by Landlord.*

Eighty-five and a half roods of stone walling, six feet high, at 17*s.* per rood		72	13 4
Three gates and posts		3	3 0
First ploughing, at 20*s.* per acre		21	0 0
Second ditto, at 15*s.*		15	15 0
Third ditto, at 10*s.*		10	10 0
Three separate harrowings, at 5*s.* each		15	15 0
Five thousand two hundred Winchester bushels of lime, at 2½d. per bushel		54	3 4
Carriage		10	0 0

	£.		
Seventy-one Winchester bushels of wheat, at 11*s.* per bushel	39	1	0
To labourers, for stocking, levelling, clearing, and spreading the lime	15	5	2

3d Lot, 12 Acres, fenced by Landlord.

Twenty-six and a half roods of stone walling, at 17*s.* per rood	22	10	6
Sixty-seven and a half ditto of fencing, with stone ditch, double rails, and post on top, with hawthorn quick, at 10*s.* per rood -	33	15	0
Fifty-eight ditto of sunk fence, with staggers on top, at 4*s.* 9*d.* per rood - - - - - -	13	19	6
Two gates and posts - - - -	2	2	0
First ploughing, at 20*s.* per acre - - -	12	0	0
Second ditto, at 15*s.* - - - -	9	0	0
Third ditto, at 10*s.* - - - -	6	0	0
Three separate harrowings, at 5*s.* each - - -	9	0	0
Three thousand two hundred and fifty Winchester bushels of lime, at 2½d. per bushel - - - -	33	17	0
Carriage - - - - -	6	5	0
Forty Winchester bushels of wheat, at 11*s.* per bushel -	22	0	0
Labourers, for stocking, levelling, and spreading the lime -	8	3	0

4th Lot, 12 Acres, fenced by Tenant.

Sixty roods of stone walling, at 15*s.* per rood - -	45	0	0
Thirty ditto of fencing, at 9*s.* 4*d.* per rood - -	14	0	0
Two gates and posts - - - -	2	2	0
First ploughing, at 20*s.* per acre - - -	12	0	0
Second ditto, at 15*s.* - - - -	9	0	0
Third ditto, at 10*s.* - - - -	6	0	0
Three separate harrowings, at 5*s.* each - - -	9	0	0
Three thousand two hundred and fifty Winchester bushels of lime, at 2½d. per bushel - - - - -	33	17	0
Carriage - - - - -	6	5	0
Forty Winchester bushels of wheat, at 11*s.* per bushel -	22	0	0
To labourers, for stacking, levelling, clearing, and spreading the lime	14	8	6

5th Lot, 8 *Acres of Fallow.*

	£.	s.	d.
One ploughing, at 20*s.* per acre (one waste)	7	0	0
One harrowing, at 5*s.* per ditto	1	15	0

6th Lot, 32 *Acres.*

	£.	s.	d.
One hundred and ten roods of stone walling, at 17*s.* per rood	93	10	0
Six ditto of fencing, at 9*s.* 4*d.* per rood	2	16	0
Three gates and post	3	3	0
One ploughing, at 20*s.* per acre	32	0	0
One harrowing, at 5*s.* per acre	8	0	0
Seventy-one Winchester bushels of oats, at 3*s.* 4*d.* per bushel	12	7	0
Twenty-four ditto of pease, at 5*s.* per bushel	6	0	0
Eight ditto of summer vetches, at 6*s.* per bushel	2	8	0
Four thousand five hundred and fifty ditto of lime, at 2½d. per bushel	47	7	11
Carriage	8	15	0
Second ploughing for wheat, at 15*s.* per acre	24	0	0
One harrowing, at 5*s.* per acre	8	0	0
Ninety-five Winchester bushels of wheat, at 11*s.* per bushel	52	5	6
Two hundred and forty ditto of soot, at 6*d.* per bushel	6	0	0
Sowing the same, at 5*s.* per one hundred bushels	0	12	0
Paring and burning five acres, at 1*l.* 16*s.* per acre, for turnips	9	0	0
Spreading the ashes, at 2*s.* 6*d.* per acre	0	12	6
Two extra ploughings, at 10*s.* per acre each	5	0	0
Two ditto harrowings, at 5*s.* per acre each	2	10	0
To stocking, levelling, clearing, and spreading the lime	20	6	0
Five pounds of turnip seed, at 1*s.* per pound	0	5	0
Two hoeings, at 7*s.* per acre	1	15	0
	£. 1073	1	4

We, whose names are hereunto subscribed, do certify, that the improvements above described are well known to us, and that all the facts are accurately stated.

Rev. Mr. Bourke, (now in London) Vicar of St. Martin's.
Peter M'Kernie, Churchwarden.
C. Morrall, Bellmont.
James Donne, Vicar of Llanyblodwel.
Richard Croxon, Oswestry.

No. VII.

Experiments made at the Request of the Board. *By Mr.* John Wright.

My Lord, Pickworth near Stamford, Dec. 18, 1805.

The following is an account of the experiments entrusted to my care, by the Board of Agriculture, for last year.

Experiment I.

Conclusion of the Experiment on the comparative Value of Manures—fourth Year Oats, after Clover on one Ploughing.

Feb. 26, 1805, ploughed the clover ley for oats; March 7, sowed and harrowed the four half roods, with $2\frac{1}{2}$ pecks each.

August 14, mowed and gathered into sheaves, and on the 24th threshed, on a large cloth in the field.

PRODUCE.

	Bush.	Pecks.		Bush.	Pecks.		£.	s.	d.
No. 1. Fresh stable dung	4	3	Per acre	38	0	Value at 24s.	5	14	0
No. 2. Rotten ditto	5	0	———	40	0	———	6	0	0
No. 3. Burnt straw	4	3	———	38	0	———	5	14	0
No. 4. Without	4	0	———	32	0	———	4	16	0

The half rood without manure, producing after the rate of four quarters per acre, rather surprised me, and shews the fertility of the manures to be greatly abated; which, however, on this light soil, is no more than what might be expected.

Recapitulation.

Value of the Crops for four Years.

	£.	s.	d.
No. 1. Fresh stable dung, first year turnips, per acre	3	0	0
second ditto barley, at 36s. per quarter	6	17	3
third ditto clover,	1	10	0
fourth ditto oats, at 24s.	5	14	0
	£.17	1	3

	£.	s.	d.
No. 2. Rotten dung, first year turnips, per acre -	2	15	0
second ditto barley - -	8	5	4½
third ditto clover - -	1	11	6
fourth ditto oats - -	6	0	0
	18	11	10½
No. 3. Burnt straw, first year turnips, per acre -	1	15	0
second ditto barley - -	6	16	1½
third ditto clover - -	1	7	0
fourth ditto oats - - -	5	14	0
	15	12	1½
No. 4. No manure, first year turnips, per acre -	0	4	0
second ditto barley - -	3	6	4½
third ditto clover - -	0	12	0
fourth ditto oats - - -	4	16	0
	8	18	4½
Gross produce of one acre for four years, manured with 24 tons of fresh stable dung, in a straw state - -	17	1	3
Ditto of one acre unmanured, on the same soil - -	8	18	4½
Value of the stable manure to the occupier -	8	2	10½
Gross produce of one acre for four years, manured with 16 tons of rotten stable dung, made from the same materials, 8 months old	18	11	10½
Ditto, unmanured, on the same soil - - -	8	18	4½
Value of the rotten dung to the occupier -	9	13	6
Gross produce of one acre for four years, manured with 6 tons of dry barley straw, burnt on the ground, ploughed shallow immediately and sowed - - - -	15	12	1½
Ditto one acre unmanured, in the same soil - -	8	18	4½
Value of the burnt straw to the occupier -	£.6	13	9

This experiment shews the value of manures to the farmer in a very inviting point of view indeed, and how much it behoves him to strain every nerve to obtain a copious dressing for his ground, if he would farm to profit, which is what we all aim at. In the comparison of manures, rotten dung appears superior, but that depends upon whether 24 tons of stable dung would make 16 of rotten or spit dung 8 months old. I am of opinion it would not, at least such as I used, and perhaps not more than 12 tons: now, if only 12 tons had been employed in the present case, instead of £9. 13*s.* 6*d.* in all probability there would have been but £7. 4*s.* 1½*d.* which is almost one pound less than the stable manure produced; therefore we cannot be certain which of these is best, until we know at a certainty how much a ton of stable manure will weigh when rotten: however there is one thing we may be satisfied about, that they are both exceedingly valuable to the farmer, as well as the burnt straw.

Experiment II.

An Experiment to prove whether Spring Wheat, Barley, Oats, or Autumnal Wheat, will pay the Farmer best after Turnips; the Turnips fed off by Sheep.

April 8, 1805. Four half roods were measured off and sowed, in the following manner, all on the same day.

		Peck.	Quart.	
No. 1.	Sowed with	1	1	of spring wheat, broadcast.
No. 2.	Ditto -	2	0	of barley, ditto.
No. 3.	Ditto -	2	4	of oats, ditto.
No. 4.	Ditto -	1	2	of common autumnal wheat, ditto.

I do not know whether your Lordship may consider the above quantities of seed the most proper; I can only add, they are the most general quantities used here. They all proved very fine crops, but the rapidity of the growth of the spring wheat was truly astonishing.

PRODUCE.

	Bush.	Peck.	Qt.	£.	*s.*	*d.*		£.	*s.*	*d.*	
No. 1. Spring wheat	3	1	1 at	3	0	0	per quarter	1	4	7¼	reaped Aug. 31.
No. 2. Barley -	5	0	1 at	1	16	0	- -	1	2	7½	ditto —— 31.
No. 3. Oats -	7	0	2 at	1	4	0	- -	1	1	2¼	ditto —— 24.
No. 4. Autumnal wheat	2	0	1 at	3	0	0	- -	0	15	2¼	ditto Sept. 20.

The autumnal wheat, although a very fine crop, was, from being so late sowed, overtook by the mildew; which, I fear, must often be the case, especially as this

was not a mildew year; as it was perfectly green when all the others were down ripe. It appeared, indeed, as if Nature had not time to perform her offices, as many large ears were nearly empty, being nothing more than shapes of ears. The superiority of the spring wheat over the autumnal, is very great indeed, being £3. 15*s.* 4*d.* per acre, exclusive of the difference in quality, and the price each would have fetched at market, as the spring wheat was worth at least 10*s.* per quarter more than the other, on account of its being mildewed, and very thin and light, which makes more than £4. 15*s.* 4*d.* per acre superiority, which is the value of an ordinary crop. I have charged them all at the prices I judged necessary they should be at to pay the grower, and not what they would actually have sold for at the time; wheat at £3.; barley at £1. 16*s.*; oats at £1. 4*s.* Should you think these prices improper, they may be easily altered.

Experiment III.

An Experiment made, in order to ascertain the proper depth Seed Barley should be deposited in the Earth, after Turnips, to produce the greatest Crop.

April 9th, 1805. Four half roods were measured off, ploughed, and sowed as follows:

No. 1. sowed with two pecks of barley, the ground tilled and harrowed fine, and then the seed sown, and no more harrowing than merely to hide the seed from the birds.

No. 2. Sowed with ditto, previous to harrowing, consequently buried deeper than No. 1.

No. 3. Sowed with ditto, and ploughed in two inches deep.

No. 4. Sowed with ditto, and ploughed in four inches deep.

The crops of all excellent, and no superiority discernable by the eye: all reaped September 2d.

PRODUCE.

	Bush.	Pk.	Qt.		£.	*s.*	*d.*
No. 1.	6	0	2	value per acre, at 36*s.* per qr.	10	18	3
No. 2.	5	2	1	- - -	9	19	1½
No. 3.	5	0	5	- - - -	9	5	7½
No. 4.	5	0	4	- - -	9	4	6

This experiment appears quite conclusive in favour of shallow sowing, as the

quantity decreases every time as the seed is laid deeper. I shall beg leave to assign two reasons for it, though, perhaps, neither of them the real cause. First, by harrowing No. 1, previous to sowing, the surface was laid even, and the seed fell much more regular over it; whereas, when seed is sowed upon rough land, it is not uncommon to see ten corns lie in a square inch, and a square foot near it, without one, owing to the seed rebounding, and falling into the lowest parts; it likewise gets buried at different depths, and consequently is not all up together. Secondly, by ploughing, it is unequally distributed, and some of it totally buried, especially that four inches deep. After all, this, like a great deal of other agricultural practice, must be left to the skill of the agriculturist; for upon a dry burning soil, highly manured, and a hot, dry summer, the ploughed in might answer the best; but upon a cool, loamy soil, I should prefer the harrowing.

Experiment IV.

An Experiment made to ascertain the Effects of Manures for Barley, on naked Fallow.

April 11th, 1805. Nine half roods were measured off, manured, and sowed as follows, with two pecks of barley each:

No. 1. Manured with one cart load of long fresh stable dung.

No. 2. Two ditto.

No. 3. Three ditto.

No. 4. One fourth of a load of the same dung, rotten spit dung.

No. 5. One half of a load ditto.

No. 6. Three fourths of a load ditto.

No. 7. Three quarters of a ton of barley straw, spread over and burnt immediately before sowing the seed, and well harrowed in.

No. 8. Three quarters of a ton of bean straw, burnt the same.

No. 9. No manure: all mowed Sept. 9th.

PRODUCE.

	Bush.	Pk.	Qt		£	s.	d
No. 1.	3	0	5	value per acre at 36*s.* per qr.	5	13	$7\frac{1}{2}$
No. 2.	3	1	2	- - -	5	19	3
No. 3.	3	2	0	- - - -	6	6	0
No. 4.	3	0	4	- - -	5	12	6

	Bush.	Pk.	Qt.						*L.*	*s.*	*d.*
No. 5.	3	1	1	-	-	-	-		5	18	$1\frac{1}{2}$
No. 6.	3	1	6	-	-	-			6	3	9
No. 7.	4	0	0	-	-	-	-		7	4	0
No. 8.	3	1	7*	-	-	-			6	4	$10\frac{1}{2}$
No. 9.	2	1	4	-	-	-	-		4	5	6

I have the honour to be, &c. &c.

* I have one remark to make on the bean straw producing less than the barley straw. Just as we had finished burning the barley straw, and going to burn the bean, a heavy shower of rain fell, and though we waited as long as we conveniently could, to get it sowed that day, and kept turning it, yet it did not burn down well and kindly; to which I attribute the deficiency. It appears, however, very clear to me, that burnt straw, for the first crop, is a very excellent manure; as soon as it came up it looked best, and all through the summer the difference in colour was discernable, as far as the land could be seen. Here is £3. within 18*d.* for the barley straw burnt on the first crop; the whole was thrashed on a large cloth in the field, which I find the most accurate method: the greatest disadvantage is, it employs the hands when wanted for harvest.

No. VIII.

COMMUNICATIONS ON SPRING WHEAT.

I.

By the Right Hon. Sir Joseph Banks, *Bart.*

Real spring wheat, the *Triticum Œstivum*, or summer wheat of the botanists, is a grain too tender to bear the frosts of the winter, but as quick in progress from its first shoot to ripeness, as barley, oats, or any other spring corn.

It is well known on all parts of the Continent, and much used in France, where it is called *Blé de Mars*, from the season in which it is usually sown; and in some provinces *Bleds Tremois*, from the time it takes between seed time and harvest; in Spanish it is called *Trigo de Marzo*; in Portuguese, *Trigo Tremes*; and in German, *Sommer Waitzen*; all which names mark distinctly the difference between this and winter corn.

It does not appear from the older books on husbandry, that it was at any former period much cultivated in England; the more modern ones are in general silent on the subject of it; they mention, indeed, under the name of spring wheat, every kind of winter wheat which will ripen when sown after turnips in February. This is probably the reason why the real spring wheat has been so little known, agriculturists in general conceiving themselves to be actually in the habit of sowing spring wheat, when in reality they were substituting winter wheat in its place, have been little inclined to inquire into the properties of the real spring wheat when they had an opportunity of so doing.

In the lower parts of Lincolnshire, where the land is the most valuable, and consequently the most subject to mildew, spring wheat has been long known, and it is now cultivated to a great extent. Mr. Sers, of Gedney, near Spalding, has this year claimed a premium of the Board for the largest quantity of land sown with spring wheat, in 1805; his quantity is 241 acres, and there is no reason to suppose that he added a single acre to his crop on account of the Board's offer. He is a

man who, by his skill and talents in agriculture alone, has raised himself to opulence, and possesses a considerable landed estate, for which he is certainly in part indebted to the free culture of spring wheat during the last thirty years.

Mr. Sers sows spring wheat from the 25th of March till the first week in May; for a full crop he sows 14 pecks on an acre, and expects to reap four quarters; if he sows seeds under it, which is very generally practised, he sows nine pecks, and expects three quarters in return; he finds it thrive nearly equally well on his stiff and his light land; and has found it, by experience, to be exempt from the mildew or blight, and free from all damage of the grub or wire worm.

The farmers in South Holland, where Mr. Sers resides, uniformly declare that they have been many years ago compelled, by frequent attacks of the mildew or blight, to abandon almost entirely the sowing of winter wheat, and that they then substituted spring wheat in its place, and have used it ever since: they believe it to be wholly exempt from the mildew or blight. In the neighbourhood of Horncastle, where I live, the land is either light or sandy, or composed chiefly of Norfolk marle, called in that neighbourhood white clay. Such land, though tolerably productive in barley and seeds, is not to be compared with the rich and fertile tracts of South Holland; and yet the culture of spring wheats has of late years increased, and is now increasing fast, because the millers begin to understand its nature, and cease to undervalue it as they did at first.

The grain of spring wheat is considerably smaller than that of winter wheat; in colour it resembles red lammas so much, that it may be mixed with that grain, and this mixture will do no injury to the seller, as spring wheat weighs heavy; nor to the buyer, as it yields better at the mill than from its appearance might be expected; 60 *lb.* a bushel is about its usual weight. Mr. Sers's, of this year, weighed 61 *lbs.* and he has sold some mixed with less than half of red lammas, at the usual market price of the winter wheat of the last harvest, though the winter wheat is better in quality this year, and the spring worse than usual.

In the countries best acquainted with its culture, spring wheat is preferred to all other corn for raising a crop of seeds. This is owing to the small quantity of leaf it bears, less perhaps than any other corn, and to the short duration of the leaf, which fades and falls down almost as soon as it has attained its full size.

In cases where red wheat has been damaged by the wire worm, a mischief which seems of late years to have increased in this island, spring wheat appears to hold out an easy and a simple remedy. In the first week of May the ravages of the

worm have abated somewhat; if then the seed of spring wheat is at that time dibbled, or only raked with a garden rake into the naked spots left by the worm, though it will not attain the growth at which the worm begins to prey upon it till he has changed his state for that of a winged beetle, will certainly be ripe as soon as the winter wheat, and may be thrashed out and sold with it; or if it is preferred, may be reaped separately, as the appearance of the ears, which in the Lincolnshire sort have longer beards or awms that the rivett or cone wheat, will point it out to the reapers in such a manner, that no great error can happen in separating it from the lammas.

In years of scarcity, this wheat offers a resource which may occasionally be of the utmost importance to the community; of this the Board were very sensible last spring, when they offered premiums for the increase of its culture, which have had the effect of rendering it much more generally known than otherwise would have been the case. The price of wheat seldom advances much, even in very scarce years, till a considerable portion of the crop has been thrashed out, and the yield of it by this means actually ascertained; but this does not take place till the seed time of winter wheat is wholly over; no speculation, therefore, of sowing an increased quantity of that grain, can be entered into during the first year of a scarcity; but before the end of April, the question of the average yield of the preceding crop will be generally known, and when it is much below the usual proportion, there can be no doubt that a large quantity of spring wheat will be sown, if the seed can be easily procured.

It is rather melancholy to reflect, that the progress of agricultural improvements has in some instances advanced in the inverse ratio of the utility of the novelty recommended to the public. Tobacco and potatoes reached Europe at much the same period, the time when Virginia was settled by Sir Walter Raleigh; but an ineffectual firmaum was issued by the Great Mogul, against the use of tobacco, long before potatoes were commonly cultivated in the gardens of England, and that nauseous weed reached the furthest extremities of the Chinese empire, in spite of the obstacles placed by the government of that country, against the introduction of novelties of any kind, long before potatoes had occupied any extensive portion in the field cultivation of this island.

Lest the revival of the culture of spring wheat, even under the liberal protection it has received from the Board, may be retarded by this principle, which seems to be inherent in the nature of mankind, it may be advisable to state here, that in the

neighbourhood of Boston and Spalding, in Lincolnshire, the cultivation of it is now fully established, and likely to continue; from either of these places, therefore, the seed may at any future time, as well as at present, be obtained without difficulty; and as there is a water communication between these towns, and as Boston is a sea-port, it may always be brought to London, or any other maritime part of England, at a small charge.

In times when dearth recurs, which will occasionally happen as long as the manufacturing interest insist on keeping the price of corn, in a plentiful harvest, below the actual cost of growing it, speculations on the sowing of spring wheat may be carried so far as to raise the price of seed, till a saving in it becomes a matter of political as well as of economical importance; an experiment is therefore added, to shew that spring wheat will succeed as well by dibbling as by broadcast, made in the spring, 1804.

Mr. Wm. Showler, an intelligent farmer at Revesby, in Lincolnshire, dibbled four pecks and a half of spring wheat on one acre and two roods of middling land which had borne turnips the winter before, and had no extraordinary preparation for this crop; the rows were eight inches asunder; the holes four inches asunder and two inches deep: two grains were put into each hole.

The produce from the quantity of $4\frac{1}{2}$ pecks of seed was 7 quarters, or 4 quarters, 1 bushel, and 1 peck an acre; a fair crop, and as much at least as could have been expected from 18 or 21 bushels sown broadcast on the same land.

By a careful analysis in the wet way, conducted by Professor Davy, of the Royal Institution, the following results have been obtained from different kinds of wheat:

From 100 parts of best Sicilian wheat,	*gluten*	21	*starch*	75	*insoluble parts*	5
of spring wheat of 1804	——	24	——	70	——	6
good English wheat of 1803	——	19	——	77	——	4
blighted wheat of 1804	——	13	——	52	——	44

From this ingenious analysis we may fairly deduce, that bread made of the flour of spring wheat is more nutritious than that made of winter wheat, because spring wheat contains a larger proportion of the gluten or half animalised matter; and also that a miller ought not to deduct from the price of spring wheat more that 2 per cent. on the money price of winter wheat of the same weight, as the excess of the weight of insoluble matter, or bran, is no more than 2 per cent. when compared with good English winter wheat.

Bread made of spring wheat is rather less white than that made of the better sorts of winter wheat; but it is allowed to be more palatable in Lincolnshire, where it is best known. Both these qualities are probably owing to the excess of gluten contained in it.

J. B.

II.

Spring Wheat. By Mr. Peter Sers.

To the Honourable Board of Agriculture.

I most humbly beg to inform you, I have this year grown 241 acres of spring wheat, and a good crop, and expect four quarters per acre, except a part of it that is laid down for grass, and on that I sow about nine pecks per acre, which I will venture to say has more than three quarters per acre; only on all our land we keep under plough, we sow 14 pecks per acre. I have several sorts of soil, such as sandy, and very light earth, also mixed earth, and very strong clay, and it seems to suit every sort; and we sow from the 25th of March until the 4th of May; and the destructive worm which has done me the greatest damage on my winter wheat, sown in autumn, which the worm takes when we only begin to sow our spring wheat, and it has not been hurt. We sowed a deal last year, and not any of it hurt with the fatal mildew, which nearly destroyed me 250 acres of winter wheat, and by the help of our spring wheat, which was so good, we mixed it together, and greatly helped the sale. I have taken the liberty of sending Sir Joseph Banks samples both of last year and this, in the straw, &c. and I hope his Honour will shew you; and any further information I can offer to the Honourable Committee, will give me the greatest pleasure.

From your most obedient and humble servant,

Peter Sers.

Gedney, Lincolnshire, Sept. 28, 1805.

This is to certify, that on the 20th of Sept. 1805, I finished measuring for Mr. Sers, of Gedney, 241 acres of spring wheat.

Francis Grant,
Surveyor, Long Sutton.

Mr. Sers' *Letter to Sir* Joseph Banks, *Bart.*

I HAVE, by the coach, sent your Honour samples both of spring and winter wheat, of this year (1805), now threshed, which your kindness will shew to the Board; and of our large quantity cannot see it is injured; it weighs as heavy as any red wheat we have grown. We have sold a small time back 200 *qrs.* to a merchant, mixed $\frac{3}{4}$ spring wheat to $\frac{1}{4}$ red of winter wheat, at full an average price with us of any quantity or quality sold in our markets to merchants; and we weighed several cooms, that is 4 bushels, and they weighed $17\frac{1}{2}$ *st.* neat each, which is more than any wheat of mine has before weighed; though the corn is not large, is full, and goes close together. I fully think with you, that if winter wheat be damaged, it would be a good way to sow some spring wheat by a man about Lady-day, in the vacant places, and rake it in, as it is sure to be fit to cut with the winter wheat, and when threshed together, no body can tell it.

III.

Spring Wheat. By John Coggan, *Esq.*

HAVING observed in the public prints, an advertisement from the Board of Agriculture, dated the 12th of April, 1805, stating, "That the Board, having received information from various districts of the benefit arising from the cultivation of spring wheat, and it appearing to the Board, that at that period it might be particularly useful to promote that object,

"Resolved to offer the following premiums, viz. To the person who shall, in the spring of 1805, cultivate the greatest number of acres of spring wheat, not less than twenty, fifty guineas, or a piece of plate of that value; and for the next greater quantity, thirty guineas, or a piece of plate of that value."

Wishing as much as possible, under existing circumstances, to meet the Board's intentions, I have sown twenty-two acres and a half of land with spring wheat, seventeen and a half of which is little better than a common. Had the advertisement appeared sooner, I should have reserved land that had been long in cultivation for this purpose; nor is it in my power at the day appointed, namely, to-morrow,

to deliver in a just account of the produce; a few days, however, will enable me to do it. But whether this delay will exclude me the premium or not, I shall most readily give the Board every information in my power, and cheerfully submit to their determination, only stating, that from the lateness of the harvest being got in, I have not been enabled to get the spring wheat threshed out, without neglecting other parts of my business.

I cannot, however, flatter myself the produce of the twenty-two acres and a half will be more than twelve loads of marketable wheat.

Our common was inclosed in 1803: in September of that year I grubbed up the furze, and in the spring of 1804 ploughed five acres of it very deep, and planted potatoes, which yielded above four hundred bushels per acre. In the spring of 1805 this land was sown with spring wheat, on the 11th day of April.

Three other acres of this field was, in the year 1804, sowed with hog peas, upon one ploughing, and produced a very good crop. These three acres were ploughed in February, 1805, and on the 11th day of April sown with spring wheat.

Eight other acres of this land was broke up in January, 1804, and sowed with turnips in June, and fed off with sheep early in spring 1805; then sown with spring wheat on the 11th day of April. The above sixteen acres are in one field. The soil light sandy loam. The crops ripened nearly at the same time: that sowed in May was quite as good and as forward as that sown in April.

For experiment only I unturfed an acre and an half more of the common, took away the turf, and upon one ploughing sowed the spring wheat on the 1st day of April, 1805. The seed came up very well, but went off very fast in about a month after, and was a very light crop at harvest. This soil was a strong loam, inclinable to clay, very cold and wet.

Five other acres, which had been in cultivation for many years, was at the time it came into my hands (by the inclosure, 1803), an oat stubble; had been much neglected, and of course both poor and foul. This I summer-fallowed in 1804, until the month of August, and sowed it with turnips, which were fed off with sheep in spring 1805: ploughed early in April, and sowed with spring wheat on the 19th of April 1805. Three bushels of seed wheat were sown on every acre, broad-cast.

The wheat that was sown upon the common is all of a very dark colour, is very cold; it weighs fifty-six pounds and a half per bushel of eight gallons, and at market fifteen guineas per load was offered for it. I did not observe any appearance

of blight during the time of its growing; but the violent storm in July beat it all down flat, and it suffered very much from that circumstance, I am convinced.

The wheat sown upon the five acres of arable land is of a fine colour, and of an excellent quality; except that it partakes of a little smut. This wheat recovered itself after the storm in July: it weighs fifty-nine pounds and an half per bushel of eight gallons, and seventeen pounds ten shillings per load was offered for it at market on Friday last.

I cannot tell the name of the seed wheat; the greater part of it was procured for me, as spring wheat, at Rye in Sussex. It is a bearded wheat; but as I send samples of it in the straw, as well as samples of it in corn, the Board will be best able to determine what the wheat is.

I beg leave to caution the Board against an idea that prevails, that any wheat sown as late as February is entitled to the appellation of spring wheat. Indeed it would (if I may be allowed to make the observation), have been better had the advertisement stated, that no wheat would be considered as spring wheat that was sown sooner than the middle of March.

All my spring wheat came up in a few days after it was sown, was regular, and wonderfully quick growing, being as forward at the harvest as the autumn sown wheat. The red gum attacked my autumn wheat, but did not affect the spring wheat in the adjoining field; in fact, it might be considered as the same field, being only separated by a ditch and a new quick hedge only ten inches high.

My experiments, it will appear, have been made under great disadvantage, only five acres of it being properly arable, and that in an exhausted state; the remainder all a furze common, without manure, and which had not been broken up beyond the memory of man.

Some years ago I tried a single acre of spring wheat in this parish, sown as late as the 4th day of May. The season was wet, the land in a high state of cultivation, but sandy; it produced five quarters per acre, was of fine quality, and fetched a good price. And had not my land laid in small parcels, it was my intention at that time to have made further trial to a great extent; but I could not carry it into practice but at the prejudice of other persons' crops, the land laying at tenantry.

If time can be allowed me, I shall furnish the Board with every particular as to produce of flour, &c. I am threshing with a mill, and suppose ten days or a fort-

night would be the extent of the time required. If I am favoured with an answer to this, I request it may be directed for me at the East India House, or at Laleham, near Staines, Middlesex.

I am, Sir, your most humble servant,

JOHN COGGAN.

Laleham, February 3, 1806.

Enclosed is the Certificate of Thomas Harrison, of Laleham, as to the quantity and quality of the land.

P. S. I beg leave to add, that in case the above mentioned quantity of land should not entitle me to the first premium, I consider myself a candidate for the second, which relates to cultivation, and not quantity.

I Thomas Harrison, of the parish of Laleham, in the county of Middlesex, farmer, do certify, that John Coggan, Esq. of the parish of Laleham, sowed twenty-two and a half acres of spring wheat, part of which was sowed upon land lately brought into tillage, and part upon land lately inclosed, and had been much neglected. The above land was measured by me to ascertain the quantity, and which measured twenty-two acres and a half statute measure. The wheat was sown between the 1st day of April and the 1st day of May, 1805.

Given under my hand this 30th day of January, 1806.

THOMAS HARRISON.

IV.

Spring Wheat. By Mr. Calthrop.

"THE Board of Agriculture having received information from various districts, of the benefit arising from the cultivation of spring wheat, and it appearing to the Board that at the present period it may be particularly useful to promote that object, have resolved to offer the following premiums:

" To the person who shall, in the spring of 1805, cultivate the greatest number of acres of spring wheat, not less than twenty, fifty guineas, or a piece of plate of that value.

" Accounts verified by certificates to be produced on or before the first

Tuesday in February 1806.—It is required that the soil, quantity of seed, sort of wheat, time of sowing, produce and value of the crop, and the effects of any distemper which may attack the plants, be reported.

" For the next greatest quantity thirty guineas, or a piece of plate of that value.

" For the next greatest quantity twenty guineas, or a piece of plate of that value.

" The Board has been informed that the true spring wheat may be sown successfully so late as the end of April. Several correspondents on the subject of the last harvest observed, that the spring wheat had escaped the mildew in parts of the country where the autumnal had not, and yielded better.

" To the person who shall report to the Board the result of the most satisfactory experiments on spring wheat, which shall ascertain the soil, the sort of wheat, the time of sowing, the produce and value, the comparative advantages of this and common wheat, and any other circumstances useful to be known, a piece of plate of the value of twenty pounds.—To be produced on or before the first Tuesday in April 1807."

From the foregoing advertisement, I am tempted to submit the following account:

An Account of Spring Wheat, the Produce of 82 *Acres* 14 *Perches of Land in Gosberton Fen, (which has been inclosed six Years last Lady-Day), cultivated by* J. G. Calthrop, *of Gosberton, in the County of Lincoln, in the Spring of* 1805.

Soil.	A.	R.	P.
Moor upon clay - - -	42	0	14
Moor upon sand - - -	40	0	0
Total -	82	0	14

Sort of Wheat.—Horned or rough-eared spring wheat.

Quantity of Seed.—20 Quarters, which is 8 pecks per acre. The 14 perches were included in the 20 quarters.

Produce.	QRS.	C.	S.
Good wheat - - - -	413	1	3
Refuse, or hinder ends - -	26	1	2
Total -	440	1	1

	QRS.	C.	S.			£.	s.	d.
Value of the Crop.	413	1	3	at 50*s.*	=	1034	13	9
	26	1	2	at 25*s.*	=	33	8	9
Total -	440	1	1		=	1068	2	6

Effects of Distemper in the Plants.—The crop suffered in some slight degree from the smut, or bunt; the usual effects of which disease are, that the ear of the plant affected assumes the appearance of a black powder.

I have been in the habit of growing spring wheat for twenty-five years, and never knew it suffer from the mildew, as winter wheat frequently does.

J. G. Calthrop.

We whose names are hereunto subscribed do certify, that the above is a true statement. Witness our hands this 18th day of January, 1805.

W. Barnes, Minister of Gosberton.
W. Dods,
Henry Syson, } Churchwardens and Overseers of the Poor.

V.

Spring Wheat. By Nathaniel Wedd, *Esq.*

Sir,

I have been given to understand, by an agricultural gentleman, that a premium of fifty guineas is offered by the Board for the largest grower of spring wheat last year.

I do not find that premium among the printed list I have for 1805. However, I send inclosed a certificate of my quantity, agreeably to what I am informed is required by the Board.

I am, Sir, your most obedient servant,

No. V.

January 31, 1806.

To the Secretary of the Board of Agriculture.

Nathaniel Wedd, of Trumpington, Cambridgeshire, certifies, that all the parti-

culars contained in the Paper No. V. are strictly true. And that the 82 acres 2 roods 7 perches of spring wheat were grown by him at Soham, in the county of Cambridge, in the year 1805.

January 31, 1806.

I do certify, that Mr. Nathaniel Wedd, of Trumpington, Cambridgeshire, did grow 82 acres 2 roods 7 perches of spring wheat at Soham, in Cambridgeshire, in the year 1805; and that every other particular relating to spring wheat contained in the Paper No. V. to be strictly true.

David Ellis,
Bailiff to Nathaniel Wedd.

January 31, 1806.

The quantity of spring wheat grown by No. V. in 1805 is 82 acres 2 roods 7 perches. Half of this quantity is estimated at 4 quarters per acre; the other half at 3 quarters 4 bushels per acre.

The quantity can only be estimated, as a small part of it only is yet threshed out.

A sample of the produce, and a few ears of wheat, are inclosed with these particulars: most of these ears are set five kernels broad, which is not often found in any wheat.

This was nearly all grown upon fen land, with turf earth underneath, which is most adapted to the growth of spring wheat; as fen land in the spring will grow more rapidly than any other.

The previous cultivation was ploughing, then burning, sowed with cole-seed, fed off by sheep, and then sowed with spring wheat. The first sowing commenced the beginning of March, and finished as late as the last day in April. The earliest sown is the best quality, and the produce the greatest. Average value is about £10. per acre.

Spring wheat was always free from mildew at the time red and white wheat were much affected by it.

Quantity of seed per acre two bushels; but the earlier sown the less seed will be required.

VI.

Spring Wheat. By Mr. William Speechly.

My Lord,

It is highly probable that the cultivation of spring wheat will, in the general, prove an eligible expedient; and indeed in times of scarcity it may constantly become a measure of absolute necessity.

But the quantity of spring wheat requiring annually to be sown will depend on various circumstances, particularly the following:

First, The prospect and appearance of the autumnal sown crop of wheat in the spring.

Secondly, The price of wheat at the time being.

Thirdly, The stock of corn on hand.

Lastly, The probable prospect of obtaining a supply of wheat from abroad.

First, Whenever there is a general appearance of defect or deficiency in the autumnal sown crop in the early spring months, whether from the preceding seed-time having been unfavourable,—from the severity of the winter,—from long continued rainy seasons,—or from whatever cause; in such case, spring wheat ought to be sown in such proportion as may suffice for yielding a produce equivalent to such seeming defect or deficiency.

Secondly, At any future period when wheat may bear a high price in the spring, it will constantly be found that this circumstance alone will operate more with the farmer than every other cause herein stated united: and will, it may be presumed, without any stimulus from the Board of Agriculture, induce him to sow spring wheat with a liberal hand.

Thirdly, Should the stock of wheat on hand prove scanty, or of inferior quality, either from mildew, or from the preceding season having been unpropitious, such circumstance would also tend to show the necessity of having recourse to the sowing of spring wheat, in order to augment the stock.

Lastly, In time of scarcity of corn in this island, whether from an unfavourable season, from mildew, or from whatever cause, in such case it will at all times be highly important for to be generally known, whether such cause or causes may have also

existed abroad, and particularly in the northern parts of Europe, from whence large supplies of corn have constantly been obtained.

But in the present channel of communication, such information is rarely obtained by the farmer, whose knowledge in these matters seldom extends beyond the vague reports of the vicinity in which he resides.

Now, as every information coming from the Honourable Board is universally considered as strictly authentic, I will beg leave to submit it to your Lordship's consideration, whether it would not be right and proper for the Board annually to make such information, on the foregoing subject, as may be deemed requisite and necessary, and then to report the same to the public accordingly.

As the cultivation of spring wheat has not hitherto been in general practice, it would be highly commendable in such persons making essays therein, to report to the Board the nature and state of the soil, &c. in the which it may have been found to be most successful.

The following experiments were made: *First*, with a view to ascertain the comparative difference in point of *quantity*, between autumnal sown lammas wheat, and spring wheat, on clover lea.

Secondly, The effect of top-dressings on spring wheat, on clover lea.

Likewise, Whether spring wheat, sown on clover lea, or upon turnip fallow, would prove the more successful.

Experiment I.

In October, 1804, one half of a close (called Little Stocking), containing eight acres, was sown with lammas wheat, on clover lea. The soil a crumbly loam, but thin, by laying near a scaly rock bottom.

On the 10th and 11th of April, 1805, the remaining half of the close was also sown with spring wheat; and on a small portion of which the following top-dressings were applied:

No. 1. Dove manure.

2. Soot.

3. *A compost of sheep dung, leaves of trees, &c.

4. Very rotten stable yard manure.

* This compost can thus be obtained. It is observable that sheep in pasture grounds, during a hot and sultry season, constantly gather together in shady places, often under spreading trees,

The pigeons' dung was from my own dovecot, but if it had been purchased it would have cost at the rate of ten shillings per quarter.

For the soot I paid three shillings per quarter, at Nottingham, a distance of upwards of seven miles from hence. The expence, therefore, of carriage and spreading, &c. greatly enhances the charge of this article.

No. 1 and No. 2 were laid on with such apportionment as to bring the whole expence of each to between twenty and thirty shillings per acre.

No. 3 and No. 4 were laid on discretionarily.

The Result of Experiment I.

The crop throughout was slender, both in the autumnal and spring sown. Indeed I purposely made choice of this thin and weak soil, supposing from thence that the effect of the top-dressings would appear the more distinguishable.

	Qrs.	Bus.
When threshed, the division of autumnal sown lammas wheat did not yield a produce per acre of more than - - - -	2	5
The spring wheat (where not any top-dressings were applied) only	2	1½
Difference in favour of lammas wheat - - -	0	3½

Of the Top-dressings.

(No. 1.) The dove manure was somewhat the best.*

and in ditch bottoms, near the fences. When the flock is numerous, large quantities of their dung may from time to time be collected.

When scraped up, the leaves of trees, rotten wood, and even a part of the top soil which may have been trodden up, may likewise be added thereto. The latter, by having imbibed the urine of the sheep, may be considered as a proper ingredient.

When the hot season is over, the whole should be brought into an heap. In the winter let the heap be turned over, which by breaking and mixing will cause it to meliorate, and by the spring it will become a rich and uniform compost.

* Pigeons dung, after having undergone a fermentation, may be considered as one of the most powerful of manures, and also as one of the most eligible for a top-dressing.

Of this powerful manure, the smallness of the quantity requisite for a top dressing, renders it most exceedingly accommodate in the application.

But pigeons dung is often injudiciously applied as a top dressing, in the state in which it comes from the dove cot.

It should be considered that manures acquire powers and strength by fermentation (somewhat

(No. 2.) Soot very little inferior to No. 1.

(No. 3.) The compost of sheeps' dung, &c. proved only about equal to rotten stable manure (No. 4), and did not exceed it, as I was in expectation it would have done.

Their produce appeared in the following proportions, above the average of the crop where not any top-dressing were applied:

		Qrs.	Bus.
No. 1. Dove manure No. 2. Soot	per acre	0	6
No. 3. Compost of sheeps' dung, &c. No. 4. Rotten stable yard manure	per acre	0	3

As the various portions of corn, where the top dressings were applied, would have required much barn room to have been separately kept; as it would also have been both troublesome and expensive in threshing and dressing up each by itself, and after all very subject to error by the respective labourers employed; I thought it therefore best by endeavouring to form a judgment of each from its *bulk* and *quality* when cut, and by afterwards coming to the knowledge of the produce of the general crop (after having been threshed,) where not any top-dressings were applied, I trust that I could not have erred much by estimating from their various comparative differences.

Experiment II.

On the 22d and 23d of April, 1805, a close (called West Feld Close) containing four acres, was sown with spring wheat on turnip fallow, the soil a deep loam, and in a high state of cultivation.

similar to that of fermented liquors); therefore, when the dove cot is cleaned out, the pigeon dung should be well moistened with water, and laid in an heap in a close and dry place, to *couch*. In the course of a few days a strong heat is generally brought on, which when obtained, the outside of the heap should be again watered, and the whole turned over. In this turning care should be had to put the outside of the former into the middle of the second heap, to give uniformity to the whole.

In small dove cots, where the quantity of pigeons dung may be insufficient to bring on a fermentation, it may readily be acquired by the aid of a little fresh dung from the stable.

On a layer of stable dung, of about two feet in thickness, the pigeons dung should be put in an heap. Then if a competent quantity of dung be laid over the heap, it will speedily bring on a fermentation.

The turnip crop (which had been eaten off upon the ground by sheep), was throughout unusually fine, and perfectly clean from weeds.* It may be proper here to observe, that this close had also been sown with turnips the preceding year, viz. in 1803, but as the ground could not then be got clean of weed, &c. the turnip crop was but very indifferent. Instead, therefore, of sowing barley (as should have been in common course of husbandry), I again fallowed. This brought the land into excellent condition, and it was again sown with turnips in 1804 also.

The Result of Experiment II.

The wheat crop from the beginning showed the highest marks of vigour; and what was very fortunate in so generally heavy crop, not any part thereof was lodged or laid when cut (about one rood was gently *lolled*, as the workmen term it).

When nearly ready for the sickle, my neighbours, who had long had their eyes upon it, estimated the crop at upwards of four quarters per acre. The crop was cut on the 12th of September. From the number of sheaves per acre, and from the produce of what has already been threshed out, there are grounds for supposing that it will make good the foregoing calculations.

But the wheat proving of the first quality (a sample of which shall accompany this paper to the Board), I shall reserve the principal part of the produce in the straw, until the spring, for seed.

General Observations.

1. It may be proper to observe, that the spring wheat crop, both in Experiment I. and II. was ready to cut quite as early as my autumnal sown wheat on similar soil and situation, although the close, Experiment II. was not sown until the 22d and 23d of April.

* On land of good quality, and in a high state of cultivation, the turnip crop will most generally be found to repay amply for a second hoeing. But notwithstanding the regular hoeings, on land subject to various kinds of tall growing weeds, many that escape the hoe soon afterwards make their appearance, and overtop the turnips. In such case I have often found it needful to hand-weed them when the turnip crop has been far advanced.

This work is generally performed by women and boys.

Tall growing weeds that rise above the turnips tend to exhaust the soil, to render the crop unsightly, and late in the autumn they perfect and sow their seed; the ground thereby becomes subject to be again over-run with their various destructive species.

2. It is highly probable, that the success of spring wheat on clover lea, may hereafter be found to depend more on the coming season, than autumnal sown wheat. If the following season should prove dry, the crop would, one may well suppose, be more hazardous in the former than in the latter. In a dry summer, it may seem that spring wheat would have a better chance upon land that has been longer upon tillage than upon clover lea.

3. Turnip and rape fallow, where the soil is not too light, seem highly proper for spring wheat.

4. Pease and bean fallow may also in many instances prove eligible for spring wheat, and especially after having been ploughed early in the autumn, and benefited by the winter's rains and frost.

5. In the common course of husbandry, the close, Experiment II. should have been sown with barley, and at the same time have been lain down in seeds. Therefore, when the spring wheat was harrowed in, at the last light harrowing, clover seeds, &c. were also sown. The ground is now well set, and the seeds have prospered equal to any I ever saw.

6. The difference in produce, in point of *quantity*, between Experiment I. on clover lea, and Experiment II. on turnip fallow, ought not to be considered as any data to go upon in future experiments; because the superior quality and state of the soil in the close, Experiment II. might reasonably have been expected to have given nearly such decided difference.

7. In the application of top dressings for spring wheat it may seem, that in a long continued dry season, the most eligible way would be by applying them at the same time when the wheat is sown. Only once lightly harrowing after may suffice.

8. But in a moist and continued rainy season, top dressing would probably prove to act more powerfully by being sown upon the surface of the soil; because top dressings are most particularly calculated to invigorate the coronal roots of the wheat plants, and thereby to cause them to tiller well.

9. When top dressings are sown on the surface of the soil, the best time of applying them, it may seem, would be when the wheat is grown to the height of three or four inches; because if laid on before the blades of the corn crop afford a kind of shelter, the finer particles thereof are liable either of being exhaled by the sun, or blown away by high winds, which frequently occur at that season. Moist and showery weather, at that critical period, will aways be found of the highest

importance; therefore the farmer would do well by having due attention to the state of the weather, when employed on this business.

10. As a crop of spring wheat is so much more valuable than of any other kind of spring sown corn, there are good grounds for supposing that top dressings cannot any other way be more beneficially employed.

Before I quit these remarks, I will beg permission to state a further advantage in the cultivation of spring wheat.

11. On various soils, and in some seasons, it often happens that the autumnal sown crop of wheat may be seen to fail and to go off in patches.

In the beginning of April, by raking spring wheat into the vacant places, as also where the wheat plants may appear weak and thin set, the uniformity of the crop can be restored, and the spring wheat will be ready for the sickle quite as early as the autumnal sown.

And although such seeming kind of mixture in the crop would render its produce highly improper for seed, still, for the miller's use, no objectionable defect or deficiency would be found therein from such apparent mixture.

The Rt. Hon. Lord Sheffield,
P. B. A.

Woodborough Hall, near Nottingham,
January the 2d, 1806.

No. IX.

On the Mildew. By Mr. W. Jones, *of Foxdown Hill, Wellington, Somersetshire.*

My Lord,

It must have afforded much pleasure to all lovers of agriculture, that Sir Joseph Banks has turned his attention to that very important subject, the Mildew in Wheat, by publishing an Essay on the subject, with plates, describing the fungus, he has, by the help of the misroscope, discovered on the straw; but some time having elapsed since I saw it, I have really forgotten whether Sir Joseph considered this fungus to be the cause of the injury, or an effect of some other cause; in either case I should feel equally disposed to submit, with the greatest deference to your Lordship, and the Board over which you have the honour to preside, an hypothesis as to the cause of the injury, founded on some observations; being well assured that if it should be seen by Sir Joseph Banks, and not accord with his present opinion, or that of the Board, yet it will be considered with all that liberality of sentiment that is sure to accompany superior attainments. I have therefore flattered myself with experiencing indulgence for the first part of this Essay, and to hope for the approbation of the Board as to the second part, which treats of the state or condition in which the wheat should be reaped, and the subsequent management of it when mildewed, that will afford some remedy to lessen this great evil; which being the result of actual experience, founded on a principle to be clearly understood by every one who will give it a few minutes consideration, I do with the greater confidence submit it to the practice of others, being well assured it will stand the test of their experience as well as my own.

I have the honour to be, my Lord, &c. &c.

The Rt. Hon. Lord Sheffield,
P. B. A.

It will be necessary for me to request the reader's attention to some particulars, respecting the mildew, that favour my hypothesis. The first is, that I believe it is generally admitted to be produced by great *dews*; and that dews having the same relation to frost, as rain to snow, I have therefore considered *frost* to be the the primary cause, and shall take unto my aid the following observations, not confined to one year or two, but the experience of many; that it is at times discovered in the leaf of the wheat plant in May, and from that time the stalk, either before or after the ear shuts out, is seldom seen to be at all effected before the latter end of July, or to be *materially injured* till a week or two in August, and then confined to the *greenest wheat, containg more sap*, without extending to *riper, containing less, in the same field.*

That plants are liable to receive injury by frost in proportion to the quantity of sap contained in them, or aqueous particles resting on them, is also generally admitted; but by way of illustration to those who may not have given the subject a consideration, I would wish to bring their recollection to what might have come within their own observation, viz. that the early garden beans and peas planted in October, and November, which have resisted the severe frosts in December, and January, have, after a few warm genial days in April and May, that have quickened vegetation *and increased the quantity of sap*, received a severe check by a *much slighter frost* than they withstood in the winter months. To instance another circumstance within my own knowledge—upwards of twenty years ago, two rows of French beans had been planted in a border under a wall covered with long projecting thatch; it happened by mere accident that one of them was planted within side of the dropping of the eves, and the other without side; and I well remember, that in an evening the latter end of May a small misty rain fell, which was succeeded by a frost in the night, and that so severe as to occasion a *general remark* of being unusual at that period. The effect it produced on these beans was; that every plant without side the dropping of the eves, *exposed to the rain, was intirely cut off;* whereas those withinside received but a slight check, and produced a crop, having been protected from the rain by the projecting thatch.

How frequently has it happened in the months of April and May, that a frost

has set in after rain or mist, sufficient to wet the blossom of apple trees, and to destroy it? This occured in the spring of 1804, when those mists prevailed in this district in the *vales*, where the prospect of apples was totally lost, though a plentiful crop in the high lands.

That there should be some degree of frost in the month of August, though not so severe as in May, being nearly equidistant from the summer solstice, is not extraordinary; besides the *hoary* appearance on the grass is frequently to be seen before the sun rises in the beginning of August; and a thermometer placed *near the ground* in the night, in one of these cold chilling dews, would satisfy any doubts, if the degree it was reduced to was remarked *before the sun rose.*

It was a common observation, that mists prevailed in the vales the latter end of July and the beginning of August 1804, which occasioned the mildew in wheat, reducing the promising expectation of a crop of more than twenty bushels per acre to the average of eight bushels, and that of a bad quality, in lands worth from 25*s.* to 45*s.* per acre, when the high lands, worth from 8*s.* to 20*s.* per acre produced more than double that quantity, and of a superior quality: also, this circumstance was not confined to a small circle, but extended to a neighbouring county, where I saw on high mountainous situation, lands, newly reclaimed, not worth more than 5*s.* per acre, produced crops of wheat full sixteen bushels per acre, without a spot of mildew to be seen in it, when the rich lands in the vale below exhibited the sad effects of it.

That mildew is sure to affect the late sown wheat, is too well known to stand in need of examples. The reason to me is obvious; because it is *in a green state* in the beginning of August, and more subject to the effects of frost in that month; for the greater length of time the wheat has to get to maturity after the summer solstice, the longer does the sun retire below our horizon, and the longer and colder must the nights be; for who can remember, or has heard of damage by mildew, when wheat was ripe by the milddle or latter end of July?

It is perfectly within my recollection, that about twenty-five years ago, a great part of the wheat in this parish was reaped before the 20th July, and I have heard some old farmers say, that some years before, they had usually carried all their wheat by the end of July; and another, that he once finished carrying all his wheat (upwards of 30 acres) on the 25th July. Another account from a respectable quarter, I have heard, that about seventy years ago, cakes were made and sold

in a fair, held on the 7th July, from wheat grown in a field (which has been pointed out to me) within seven miles of this place. A reference to my own diary of farming occurrences shows me, that wheat was generally reaped before the end of July in the years 1786 and 1787; since that time it has been later, except the year 1791. Since our harvest must be allowed to be *later*, and we are thereby more subject to the ill effects of mildew, it therefore surely behoves us to sow all our late wheat lands (after turnips), with such sort of wheat, as is most likely to resist these cold chilling dews, that may happen before it arrives to maturity.

On making inquiry amongst some intelligent farmers, I was told of a red wheat, almost universally sown in a large extent of cold poor lands in this and in an adjoining county, where they have no chance of a crop from any other sort of wheat. I procured some of it, to sow first with vetches (to be fed with sheep), and found it to bear the winter much better than the white wheats I had usually sown.

The beginning of February, 1804, I sowed some of this sort of wheat (after turnips,) and in the same day some of the white Dutch wheat in the same field, and found the latter proved to be much more injured by the mildew, which I imputed to the stalk being so large and porous as to absorb in a greater degree the moisture of the dews; whereas the red wheat, having a smaller and more solid stalk (of course less porous also), received but very little injury. The brown bread made of this wheat is of a darker hue than that made of the white wheats, but has the good property of retaining its moisture longer than any other, and cannot be too strongly recommended for a late crop, as the hardiest wheat yet known (in this neighbourhood) approaching more in similitude to rye (which is not liable to mildew) as to the colour of the grain, the solidity of the stalk, and the properties of the bread, than any other wheat.

I have a material observation to make of some facts respecting the effects of mildew in a piece of ground situate rather higher than some of the surrounding lands, part of it sloping towards the east, and having a decent from the north and south, forming a concavity, in which the wheat, when sown after turnips, manured with lime and earth, *without any dung*, has been always mildewed, as also many other smaller concave spots which are on the summit of the field, when the surrounding wheat on the higher level ground *has not the least appearance of it*, the straw being perfectly *bright and yellow*, when the other was almost black, in so much that I have separated one from the other (in more instances than one or two) by putting

it in different stacks. These concavities, wherever they are, retaining the water longer, must of course be more damp than the higher level ground, and afford the more vapour to be exhaled from it, and the plants so situated, which in cold nights becomes so condensed as to fix, and probably freeze* on the stalk, thereby destroying the texture of it, and suffering the sap to escape, as well as too great an exudation of the perspirable matter through the longitudinal cracks that *are apparent* in it, favouring the growth of the fungus; when the wheat in the dryer and more level ground affords less vapour, and from its higher situation more in the influence of the wind and its undulating motion to disperse it, and prevent the injury.

Was a thermometer to be placed in one of these cavities, and another on the higher level ground, the former would be found to be the coldest situation, and in degree proportionate to the dampness of the ground; but for this we have the evidence of our own senses; as every man who has had occasion to go an hour or two after sun setting in the summer from a high point of land, and pass over low swampy lands, when a mist is over them, must have felt its chilling influence. The lands I occupy are light, and some of them have been for many years in a rotation of three crops, of turnips, wheat, and vetches. The manure applied to the turnip crop consisting of lime, and earth taken up near the hedges, *but no dung*; which I consider to render the straw too luxuriant, more porous, and more subject to the injury complained of, the progress of which I have attentively watched in all its stages on the different sorts of wheat, to ascertain which is less liable to it, the most proper time to cut it, and the mode of management afterwards, which brings me to the second part.

Since seasons cannot be altered, or frost prevented, it behoves us to endeavour to procure such sort of wheat as is known to ripen *earliest*, and of the *hardiest kind*; the former may be acquired by selecting the most early ripe ears in the same field, and increasing the quantity by degrees; for nature produces *varieties of species* of the same genus, and it is for man to observe and embrace them to his advantage. As to the hardiest kind, I should think higher latitudes in the North of Europe most likely to furnish it, much more so than North America, because

* We know that water, when frozen, is increased in bulk; may not, therefore, the aqueous particles resting on the stalk, in conjunction with the sap, be so frozen as to separate the fibres of the stalk by their expansion?

I know that in the same parallel of latitude there as in Europe, though their winters are much colder, yet their summers are much hotter, and the vegetation *quicker*, as is known by the sudden transition from winter, and a country covered with snow, to a beautiful verdure; for the spring there advances with a degree of rapidity we are unacquainted with in Europe; besides, wheat from North America has been already tried, and found *not* to answer well; and the tropical wheats have been also tried with no better success. We know that gardeners would always wish to transplant fruit trees from poorer lands to better, as judicious graziers (to reason from analogy with the animal creation), would procure lean cattle from lands inferior to those on which they were to fatten them.

It has been commonly said in this neighbourhood, that when wheat is mildewed, it cannot be cut *too soon*; but my own experience convinces me to the contrary; and that the proper time depends on the progress it has made; for it does not follow of necessity the disease *must be progressive:* to prove that, it will be necessary to prove also that the first cause must continue to operate, which is not the fact, according to my observation; because I have known the first attack slight, penetrating *in a small degree only* the outer bark, and without any increased injury for many days, when it has appeared afresh on other parts of the stalk, and the parts *first* affected were much more injured by the *second*, than the first attack, which I conceive to have been rendered more porous, so as to retain more moisture, and of course more susceptible of the effects of a second frost; which accounts for the more rapid progress it makes in the *later* than the *earlier* stages of the disease, from the repeated attacks of the same cause penetrating more and more to the inside of the stalk, and so corroding it, that it cannot convey any more sap for the necessary supply of the ear. As I had at times erred in letting it stand too long, at others by cutting it too soon, in both cases reducing the weight of the Winchester bushel to 51 *lb.* and 50 *lb.* and some so low as 48 *lb.* according to the degree of injury in the *same* field, which shews that, in some cases, it would be improper to cut the *whole* of a field at the *same time.* This great deficiency in the weight, extended to quantity also, and determined me to observe very particularly the last summer, the progress of the mildew, which was not so rapid as I had known it in 1804, and some other seasons; and in order to ascertain the most proper time to cut it, I had some sheaves cut, and others *pulled by the roots*, for ten days succes-

sively, and found the experiment in favour of the *latter*, *before* the mildew had penetrated to *the inside of the stalk*, but no difference in the more advanced state of the injury; and though there was some extra trouble in cutting off the roots before it was carried, yet I think it would be repaid by the superior quality of the grain, in cases where there was a necessity of cutting it very green, arising from the apprehension of the disease making *a rapid progress*. The result of this, as well as former experience, convinces me, that it would be best to let it stand till the grain becomes so solid as to admit none of the milky juice to be squeezed from it, provided the mildew has not penetrated *through the stalk*; but if it has so penetrated, it will be of no sort of use to let it stand longer, although some of that milky juice should be in *some* of the grains; for though *such* will not arrive to a full size as others, yet that as well as the rest will receive far greater injury by standing exposed to the rays of the sun (without deriving any benefit from the roots) than if it were cut; because the following management, by drying it without being exposed to the sun, will be so *gradual*, that this milky juice may in some degree be converted into the farinaceous part of the grain, that might otherwise be exhaled by the rays of the sun, which equally affects *it after it is cut*, *if exposed to its influence*, as when standing, as I have found by rubbing out some grains of the ears so exposed, and comparing them with others that were taken from the middle of the sheaf that had been more screened, which led me to think whether, by letting it remain on the ground like barley, to receive the dews, would not prevent its drying *too fast*; by this experiment I found the under part, where it happened to be thickest, was *the largest and best grain*; which led me to think of a method *of covering all the ears*, by laying the sheaves longitudinally on the ridge (after the reaper), covering the ears of the first sheaf with the second, the second with the third, and so on, so that the ears of the last sheaf only was uncovered; the third day after it was turned on the adjoining ridge, reversing the order of its lying, taking care that the side of the sheaf that had been under should be uppermost; and in three days more it was stacked up in the usual way to be made sufficiently dry to be carried. By this management a Winchester bushel weighed 58 *lb.* whereas some of the wheat in the same field, cut at the same time, and in *no degree worse mildewed*, weighed but $55\frac{1}{2}$ *lbs.* per bushel. Some of the wheat in the same field, being *not in the least degree injured by the mildew*, *weighed* 61 *lb.*; and I shall

state the comparative difference, and the number of sheaves that produced it, viz.

lbs.

Thirty-five sheaves of the wheat not in the least mildewed, produced 1 bushel, weighing - - - - - 61

Forty-two sheaves of that which was mildewed, and after being cut, *laid on the ground and covered*, produced 1 bushel, weighing - 58

Forty-eight sheaves of that equally mildewed as the last-mentioned, set up *in the ordinary way*, produced 1 bushel, weighing - - $55\frac{1}{2}$

So that the wheat which had no mildew produced $\frac{1}{5}$ more in quantity than that which was mildewed, and after being cut, laid on the ground, and covered, besides 3 *lbs.* per bushel heavier; and that which *was laid on the ground and covered*, though equally mildewed with that which was *set up in the ordinary way*, produced $\frac{1}{7}$ more, with the addition of $2\frac{1}{2}$ *lbs.* per bushel, which must be thought no inconsiderable saving to the public. But the whole saving appears by the following statement of 8 bushels of 58 *lbs.* instead of 7 bushels of $55\frac{1}{2}$ *lbs.* to be nearly $\frac{1}{6}$ wanting 11 *lbs.* only; but nothing short of it, when it is considered that all the other parts of the 464 *lbs.* produces more of the farinaceous part of the grain; because the heavier the grain is, the *less* is the bran; for 1 bushel of 58 *lbs.* will have less bran than 1 bushel of $55\frac{1}{2}$ *lbs.*:

	lbs.		lbs.		lbs.
8 bushels of 58 is	-		464	-	464
7 bushels of $55\frac{1}{2}$ is	-	-	$388\frac{1}{2}$		
			$75\frac{1}{2}$		
		Multiply	6		
			453	-	453
					11

Had this wheat weighing 58 *lbs.* per bushel produced from 42 sheaves remained a week longer before it had been cut, I have no doubt it would have been equally bad as some that had been too long deferred to be cut in 1800, and set up in the common way, when a great part of a field was so bad that it required from 66 to 70 sheaves to produce 1 bushel, weighing from 48 *lbs.* to 51 *lbs.* according to the degree of injury it had received. This great deficiency in the produce of my crop, as well as that of others in the neighbourhood, operated as a stimulus to my

endeavours to discover some means to alleviate an evil of so great a magnitude, and I can with great truth say, from higher considerations than private advantage; because when this calamity occurs in a great degree, it must abate the comforts of the higher orders of the community, by seeing the lower orders reduced to the greatest distress. If, therefore, I have employed that leisure which does not fall to the lot of every farmer, to investigate this subject with such unremitting attention, and although men of more scientific inquiry should not be inclined to subscribe to my hypothesis respecting the effects of frost, without bringing it to the test of the thermometer, yet I flatter myself it will be allowed that the knowledge of the cause is of less importance, than that of discovering a preventive of the recurrence of the evil, and a method of lessening its effects when it may occur; I have therefore to hope the principle I have laid down, as to the necessary attention to the sort of wheat the least liable to mildew, and the most proper time to cut such as may be affected, together with the subsequent management of it, will be to every practical farmer so apparent, that he will omit no opportunity of putting it in practice for his own private emolument, as also for the public advantage.*

* In case the weather was likely to be rainy, I would put the sheaves *on the ridges* (where the land is ploughed in ridges); but if it was likely to be bright sun-shine, I should prefer putting them *in the furnaces*; in both cases beginning with placing two sheaves side by side, and another on top of them, covering the ears of these with three other sheaves laid in the like manner, taking care that the tops of the two under sheaves *incline towards each other*, to secure the ears from the rain and sun; for I would be as careful to screen them from the latter as the former.

No. X.

ADDITIONAL COMMUNICATION ON STEAMING POTATOES.

By J. C. Curwen, *Esq. M. P.*

My Lord,

Conceiving it may not be unacceptable to your Lordship to be acquainted with the progress that feeding horses upon steamed potatoes and cut straw, as a substitute for hay, is making in Scotland, I take the liberty of inclosing you a letter upon that subject.

I have now had four years experience, and am more than ever confirmed in my opinions of its efficacy, and the saving both to the individual and the public. I sent a person a few months ago to Mr. Dansic, of Cleaton Park, in Herefordshire, to erect an apparatus, and to put them into the method of conducting it; and have the satisfaction to find that it answers extremely well: indeed it cannot fail, if fairly tried. I wish his Grace the Duke of Bedford could be prevailed upon to make the experiment: the extensive scale of his Grace's feeding would make it an object of consequence, and call the public attention to it. The soil near Wooburn would answer extremely well for potatoes.

The extending of the culture of potatoes is an object of great national importance, as leading to an increased growth of bread corn. Potatoes are sold in the markets in this county from 2½*d.* to 3*d.* per stone, but may be imported from Scotland, free of all charges, at 1½*d.* Hay is selling from 8*d.* to 10*d.* Since October I have steamed three hundred stone daily; allowing that quantity to be equal to half the number of stones of hay, the saving will be, at 9*d.* per stone, one pound seventeen shillings per day.

I beg your Lordship's pardon for occupying so much of your valuable time, and have the honour to be, &c.

J. C. Curwen.

To the Right Hon. Lord Sheffield,
P. B. A.

Workington Hall, Jan. 28, 1806.

Dear Sir,

I should have wrote you last night, but was prevented by the fatigue of my ride. I did not forget your boiler, but was informed by Mr. Stainten, that they had not any ready-made boilers of any kind.

In feeding their horses, the Carron Company proceed upon Mr. Curwen's plan. They have three tubs steaming at a time, two of potatoes, and one of chopped straw, chaff, or dusting-seeds; they empty one tub of potatoes into a large mash tub, by way of bottom layer, then the tub of chopped straw, and last the remaining tub of potatoes, and the whole is wrought and mixed up with a large wooden pestle: to this they add a small quantity of salt. A bucket is brought for each horse with his feed of corn (bruised betwixt rollers) in the bottom, and his proportion of the potatoes is filled in above. When it is emptied into the manger the corn is of course uppermost, and the horse-feeder puts his hand through the feed to mix it.

The proportions they give to their large horses in the works are, at mid-day seven pounds of potatoes (raw weight) to each horse, and one pound of cut straw, &c. mixed with his usual quantity of corn; and in the evening fourteen pounds of potatoes, and the same quantity of straw mixed with his corn: or they mix the straw in the proportion to the potatoes. They cook twice a day, and give the feed warm.

At their collieries, where their horses are smaller, they give six pounds at mid-day and twelve at night.

The Carron Company bought their potatoes this year at 6*d.* per boll; and I have to-day bought 200 odd bolls at the same price.

I understand the scheme is adopted at Kinnaird colliery, at Alloa and Halbeath; and Mr. Beaumont and I follow these examples.

I find by experiment that a boll of potatoes weighs 22 stone avoirdupoise.

I am, dear Sir, your most obedient servant,

W. Wotherspoon.

To John Grieve, Esq.
Ramsay Garden, Edinburgh.

Charlestown, Oct. 31, 1805.

No. XI.

On the Culture of Carrots. By the Rev. F. Eldridge.

Sir,

Seeing by the newspapers you are once more President of the Board of Agriculture, permit me, Sir, to address you on a subject which seems not to be treated of by any author that I have seen.

Mr. Arthur Young, in his Farmer's Calendar, has given a great deal of useful information concerning the mode of feeding cattle in the yard with green fodder; but in treating of the carrot, he has entirely overlooked the great value of this most useful root.

I hope you will not think me obtruding too much on your time, if I point out to you and the Board its great good qualities for feeding. My ideas are not theoretical, as I have tried it for the last six years; and though I was told by many people I was doing an injury to the carrot, I found perfectly the contrary, that I was doing it a great deal of good. In the year 1800, at Bonvilstone, in Glamorganshire, being in want of grass for a little Welsh cow, as my land was all for hay, and having ten beds of carrots in a new garden, I had the tops of the carrots mowed off a little above the crown, so as not to injure by the scythe the head or crown of the roots: this, I need not inform you, was a very luxuriant food for the cow; but I thought, and so did the servant who milked the cow, that she gave more milk when she had the carrot top than she had done before. The carrot again yielded a fine luxuriant green head, which I treated in the same manner in October. I found when the carrot itself was taken up, that it was equally as large and heavy, as a bed which I had reserved from cutting was. The gardener, who had been averse to cutting off the tops, was convinced it had not injured the root, but thought it had benefited it rather than otherwise; as he had an opportunity of hoeing and cleaning of them from weeds better than he could when they had their tops on them. I am therefore convinced, by experience, that the agriculturist who grows a quantity of carrots, loses a great quantity of most excellent green fodder for

his cattle, by not mowing the tops of the carrots off twice within the year. I therefore state this to you that it may be made public, that the farmer may be benefited by his labour to the utmost of the produce of his crop; and I trust you will, as the season for sowing is coming on, communicate it in such a manner that this most valuable root may be better understood, and of course more cultivated by the farmer than it has been: for I do not hesitate in stating, that a good crop of ten acres of carrots, by being mowed, will keep ten cows in good green fodder, the months of June, July, August, September, and October: then the root itself will be found a very useful food during the winter months; so that I really think the farmer, who consulting his own interest, will never, after he has once made a fair trial of this herb, be without it; for its richness causes a greater flow of milk, and also it creates a sweetness in the milk which in general the grass, unmixed with the Dutch clover, has not. The farmer will also find that his horses and his pigs will eat it with avidity, and thrive well on it, as I can state from experience. And for the gentlemen wishing to keep their game in nurseries, by sowing carrots round the nursery, will find that their hares and rabbits will feed upon them in preference to any other food he can procure them; by this means they will always be at home, and not stray at a distance for their nightly provender.

Your most obedient humble servant,

F. Eldridge.

To Sir John Sinclair, Bart. M. P.
P. B. A. &c.

April 7, 1806.

No. XII.

On Horses and Oxen. By Mr. R. Emerson.

HONOURED SIR,

I RECEIVED your letter on Wednesday the 30th ult. containing the mode of experiment required by the Board of Agriculture for the ascertaining the comparison between horses and oxen, in relation to their work. I hope I shall not, by offering my objections for not trying the experiment for one year under such regulations, give you offence, but flatter myself will meet your approbation. First, was I to comply with feeding the oxen with hay and corn, the same as horses, during the winter, I in consequence would subject myself to a great additional and unnecessary expence, as I am already well convinced, by a considerable length of experience, that the oxen are capable of doing as much labour in the common work of husbandry with hay only, as the horses can with their common food, viz. hay and corn. Secondly, was I to reduce the feed of the horses to hay only, and oblige them to do their usual work, I should in course soon sustain a considerable loss in the value of my horses, as I am well assured that they in such case could not possibly perform their work. Under these circumstances, was I sure of being entitled to the premium offered, my gain would be none, and particularly as there is no certainty but another's claim might be preferred. Provided, therefore, you do admit that my observations are right and satisfactory, you may give a decisive opinion in favour of oxen, as well now as a twelvemonth hence.

I believe, Sir, I once stated some observations to you, giving in my opinion the cause why oxen should endure their work better than horses, which may not be improper to repeat, viz. that the ox in his work chews his cud, and in consequence receives a supply of nutriment which continues to refresh him all day; when the work of the day is finished he hastily fills himself, and lays down to rest, and chews his cud; in the morning early he again fills himself, which furnishes him with support during his day's work; when the ploughman takes a little bread in the middle of the day, even in that short space of time taken for that purpose, the oxen often

lay down and rest. Compare the horses through the day and night, you will, I hope, find, on such comparison, that my observations are well founded: observe, Sir, that the horses, in a continued standing posture, require a great length of time before they can sufficiently satisfy themselves with food; indeed the carter is wholly employed, before and after their work, in giving them small quantities at a time, in order to induce them to eat quickly as much as possible, to enable them to have time to take rest, that they should be able to perform their work: whereas the ox-man, after foddering his oxen before and after work, milks, or any other work he is ordered to do. The shoeing of horses and many other contingent expences are very considerable: the ox requires no iron placed on his foot, but much better without. In my opinion, from experience, oxen should be harnessed at two years old, in order to make them gentle in their work, step quick, and harden the hoof, to prevent the necessity of shoeing, and, after being properly broke, should be turned out another year.

R. Emerson.

To Thomas Estcourt, Esq. M. P.

Skipton, May 11, 1806.

No. XIII.

On Wheel Carriages. By T. Estcourt, *Esq.*

The satisfactory result of Mr. Cumming's experiments before the Board on broad wheel carriages, and the evident superiority of cilindrical to conical wheels, are equally curious and important, as relating to the great turnpike roads of the kingdom; but I have often heard it stated by well informed persons, that no improvement in the form of the wheel can compensate for the injury done to the roads by the pressure of the immense weights these broad wheels usually carry. I have also heard it asserted, that a greater weight may be carried with equal ease when it is distributed in several carriages, drawn each by one horse, than when it shall be accumulated on one waggon, drawn by a greater number of horses.

Although it is impossible to doubt the justice of the inferences drawn by Mr. Cumming from his experiments, yet there seem to be almost insurmountable difficulties to the application of them practically to the improvement of the public roads. I therefore take the liberty to suggest, whether it would not be more consistent with the views of the Board, and a subject more interesting to the agriculture of the country, connected with the improvement of the roads, to investigate the question, Whether the use of one horse carts, for all purposes to which they are applicable, would be an improvement to the use of waggons and carts with a greater number of horses, or not? to endeavour to obtain an accurate statement of facts relating to it.

Should this suggestion be so far worthy of countenance as to draw the attention of the Board, the following queries, amongst others, might be attended to by those who would make the necessary inquiries upon it:—Are one horse carts in general use, instead of heavier carriages, in any part of the kingdom, and where? What is the extent of the districts where they are so used? What kind of horse or other beast is used in them? What is the form, capacity, and weight of the cart, with and without its load? What is the actual state of the roads in such district? Of what materials are such roads made? What is the amount of the expence, annually, of

the repair, per mile, of such roads? Probably these facts may be ascertained through the correspondents of the Board; and if the information should be deemed correct, the Board might make any use of it that the occasion might require, or its importance justify. It would be competent to any Member of Parliament to bring the subject under the consideration of the House of Commons, in any way that his prudence should dictate. All that the Board could do on that point would be, probably, to furnish the information for others to act upon.

If the one horse carts should have, in use, such decisive advantages, both to the roads and to the farmer, as is supposed, there seems to be an obvious way by which they might be gradually introduced into every part of the kingdom, without compulsion, and with strict equity to all parties concerned. It will be allowed, I think, that the principle adopted in levying the tolls on turnpike roads, by laying the burden of repair on those who do the injury, is perfectly unexceptionable. The repair of the parochial roads is, we know, done by a tax or duty in kind on the visible property of the parish; but if the former principle could be made applicable to the parish roads, jointly with the principle now established, of a tax on property, it would be a more equitable process. Suppose a person, rated at £50. per ann. was to use one horse carts only, and supposing another, rated at the same sum, was to use a waggon with four horses, and both carried the same weights, or that the carts carried one-third more weight, and it should be proved that the four carts, going each once, or any given number of times over a road, will do less injury by three-fourths than the loaded waggon going the same number of times, it would be perfectly equitable then that the former should be liable to be called upon for only one-fourth part of the same statute duty, or to pay only one-fourth part of the same composition as the latter. The amount of the tax would be in proportion to the injury done, and no one could have room to complain.

I have, within these few days, stated this proposal to several sensible practical farmers, who have frequently acted as surveyors of highways, and they unanimously agree in the justice of it, and that if it was carried into effect would have a most rapid and salutary effect on the condition of the roads.

I am, Sir, your most obedient humble servant,

T. Estcourt.

To Sir John Sinclair, Bart. M. P.
P. B. A. &c.

Estcourt, May 26, 1806.

No. XIV.

An Essay on the Cultivation of Potatoes. By the Rev. Edmund Cartwright.

Honos erit huic quoque Pomo. VIR.

POTATOES, though they have been naturalized to this climate for nearly two hundred years, were not considered as objects of field culture till about half a century ago; and it is not much above half that time since they were first cultivated with any other view than as the food of man.

Their primary application ought certainly to be as an article of human sustenance, and yet, unless they can be produced on such terms as will enable the grower to afford them to his cattle and hogs, when there is no demand for them in the market, he will not venture to cultivate them, except, perhaps, for the London sale, on such a scale as will always insure a regular supply.

The original country of the potatoe is Brazil; and yet, though coming from between the tropics, it is the production of a temperate climate, being a native of the mountains, at such an altitude above the general surface of the country as not to suffer by too hot or too cold an exposure. Hence it accommodates itself to the vicissitudes of an English atmosphere with nearly the facility of an indigenous plant.

I. *The Method of raising Potatoes from Seed.*

In treating of this invaluable esculent, I shall begin with pointing out the method of raising it from seed.

It is to be observed, that the apple of the potatoe, which contains the seed, rarely, if ever, finds sufficient heat in this climate to ripen. The apples, therefore, are to be gathered with their stalks, and hung up in some warm place, a kitchen, for example, or other room where there is a constant fire. In the course of the winter the apples will become pulpy, which is an indication that their seeds are ripe.

When in that state the seeds are to be separated from the pulpy part, either by washing or otherwise. When separated they are to be rubbed dry. Early in the spring they are to be sown on a warm dry border.

As it will be several weeks before the plants make their appearance, the best way is to sow the seed in pots or boxes, which in bad weather may be brought under cover, or sheltered.

The seed is sometimes sown in hot-beds, but I do not recommend the practice; for though the plants are by that method brought somewhat earlier to maturity, yet are they almost always weak and sickly. As soon as the plants are of sufficient strength, which will be about the latter end of May or the beginning of June, they should be transplanted where they are to remain. In doing this, care should be taken to select a warm situation, and where no potatoes have been grown in the former year, for fear of any roots or fragments of the last year's crop being left in the ground, and mixing with the new varieties, which it is the object of this process to obtain.

It is necessary to set the plants at such distances from each other as that their roots shall not interfere, which on the first appearance of frost, if they are not ripe before, should be taken up.

It will be sufficient the first year to reserve only a single potatoe from each plant; for as the potatoe does not assume its permanent character at one year from the seed, no judgment can be formed of its future qualities in that stage.

The potatoes thus reserved, must next year be planted out at such distances as that their produce may be kept distinct.

Great attention should be paid to the time of their ripening, as the value of a potatoe is greatly enhanced, *ceteris paribus*, by its coming soon to maturity.

In the order in which they ripen, which is known by the deadness of the haulm, the potatoes should be taken up and examined. Such as have peculiarly good qualities to recommend them are, of course, to be preserved, and all of inferior quality should be made away with, that they may not get mixed with better sorts.

In the year 1804, I raised eighty-four plants from seedlings of the preceding year, all from the same kind of potatoe. The produce of scarcely any two roots was alike, either in form, colour, size, or taste. Some ripened early in August; others were not ripe even when the frost set in; some were very prolific, others but moderately so; some were so rank and offensive to the palate as scarcely to be

eatable; and others again (but these were few in number, not more than three or four), were equal to the best potatoes now in use. One of them, indeed, was of so superior a quality that, unless it should degenerate on further cultivation, it will eclipse almost every other species hitherto known.

In raising potatoes from seed, even though no new varieties were to be obtained, there will be found a great advantage in the practice, from the potatoes being more prolific than those which have been raised repeatedly through a long course of years from sets.

II. *Choice of Sorts.*

It has been recommended to those who intend raising potatoes for the purpose of feeding animals, to cultivate the sorts which are most prolific, without regard to their quality, such as the Howard, or cluster potatoe, the black yam, ox noble, &c. &c. a practice which cannot be too severely reprobated, both as injurious to the community, and as not being most beneficial to the growers themselves.

So long as there is a market for potatoes as an article of human food, they will always bear a better price than the grower can make of them, by giving them to animals. And even when applied as the food of animals, the best sorts will always be found the most profitable, as containing the greatest quantity of nourishment in a given bulk.

It is universally allowed, that the most nutritious part of this excellent vegetable is the farinaceous or mealy part, and that the least nutritive, or rather the deleterious part, is the aqueous. Now I find by analysis, that a dry mealy potatoe, such as is usually considered of a good kind, yields of farina at least twenty-five per cent. more than such as are waxey or livery. The vegeto-animal matter also is more abundant in the one than in the other. But the latter kind is not only infeferior, in as much as it contains less nutriment, but as it contains a superabundant share of that which is deleterious, namely, the watery part.

It seems almost needless to mention, that the juice of the raw potatoe is violently purgative, as is well known to every one who has given potatoes in large quantities to cattle or hogs, without a liberal allowance of dry food. Even when boiled, if they are suffered to remain in the water after it begins to cool, they will reabsorb so much of the juices they had parted with as to render them much too laxative, if given in large quantities, to be wholesome.

The first quality in a potatoe is being mild and farinaceous. Some indeed prefer the waxey sorts, but as they bear no proportion to those who have a contrary taste, it would never answer the grower's purpose to cultivate potatoes for such capricious customers. A potatoe, to be worth cultivating as an article of field husbandry, must be not only mild and farinaceous, but also prolific. Another property, which is seldom if ever adverted to, is, that it should not run much to haulm: for when the haulm is disposed to be over and above luxuriant, the potatoes admit not of being planted so close as to obtain the greatest possible crop in a given space, the distance at which they should be planted being determined by the luxuriance of the haulm, rather than by the productiveness of the root. Another quality, and that not an unimportant one, is, that they should ripen early. In this last circumstance there are greater advantages than at first sight may appear; namely, they may be taken up at the farmer's leisure; by coming to maturity at an early period, they are ready for the market before there is a glut; and, if they are to be stored, the days being long and warm, they get thoroughly dry before they are put up, and consequently are not so apt to heat and rot as when taken up later in the season, in rainy weather, as it may happen, or in frost. Add to these considerations, if wheat or winter-tares are to follow, there is sufficient time to get the ground ready for either of those crops. It may be expected, perhaps, that I should point out the particular sorts which I have found to have united in them the principal characters here enumerated. But any one the least conversant with the subject must know that to attempt a description, which could be intelligible, beyond a limited district, would be nearly impossible, the names by which potatoes are usually distinguished being chiefly local. The sorts which have succeeded best with me were called, by those whom I had them from, the Supreme, a moderate sized white potatoe; the early red; and the white American hundred eyes; names which they are probably known by only in the neighbourhood where they were originally raised.

The two former kinds have nothing discriminating in their form or external appearance to distinguish them from the common round white or red sorts. The American hundred eyes is readily distinguished from every other plant of its species that I have yet had an opportunity of observing. It is, in general, from four to six or seven inches long, cylindrical, slender, and, as its name imports, full of eyes. These are from twenty-five to thirty in number, and rather deeply indented. But the most striking peculiarity in this variety is, that the eyes do not break out, as in

other sorts, apparently at random, but are regularly disposed in a spiral direction. It does not ripen quite so early as might be wished, but in other respects it has not at present its superior.

III. *The Soil proper for Potatoes, and its Preparation.*

Though potatoes will grow on any soil, they ought not to be cultivated on that which is cold, stiff, or wet. The best soil is a rich sand or a light loam. Very good crops, however, may be obtained even from poor soils, if dry and warm, and if well manured, and kept free from weeds, no crops making more ample returns for manure and good husbandry than potatoes.

It will be adviseable to give land intended for potatoes a ridge ploughing before winter, provided it be not a light sand. In the month of February it should be again ploughed and harrowed down, and in that state should remain till the middle or latter end of March, by which time the seed weeds will begin to vegetate. A slight sprinkling of well-digested dung should be equally spread over the field and ploughed in. But, perhaps, the best preparation for potatoes is a crop of turnips consumed on the ground: in that case nothing more is required than to give a single ploughing followed by a liberal use of the harrows.

IV. *Manuring.*

It is a prevailing custom to manure for potatoes with long litter, old thatch, and even stubble, heath, or any other substance, in short, which will keep the ground hollow, under the idea that the young tubers of the potatoes have by such means more room to spread and expand themselves.

Where the soil is a stiff untractable clay, it must be confessed that such manures are highly expedient; but on such soils potatoes ought not to be admitted, as both in quantity and quality they will always be inferior to such as are raised on a different soil.

The manures most proper for potatoes, when cultivated on land which suits them, are those which will mix and unite most readily with the soil. I know of no manures, I mean these of an animal or vegetable nature, nor, I might add, of the mineral kingdom, provided they are suitable to the soil, which come amiss to the potatoe.

The most advantageous way of applying manure to the potatoe crop is, to give part at the time of planting, and the remainder as a top dressing immediately before

earthing up. Though when the land is in tolerable heart, so as to give sufficient vigour in the first stages of germination, and till the tubers begin to form, I trust solely to the top-dressing, which is applied with peculiar advantage to a potatoe crop, as it can be given at the precise point of time when most wanted, and immediately ploughed in; by which means it loses not a particle of its fertilizing quality, by exposure to the exhaling influence of the atmosphere.

Many are of opinion, that the flavour of vegetables is influenced by the manures which are made use of in their cultivation. There is reason to doubt this opinion. In the year 1804 I had potatoes manured for with chandler's graves, with soot, and with malt-dust. Nothing can be imagined more offensive than chandler's graves when in a state of putridity, as they must be before they can be absorbed by the potatoe plants; nothing can well be more acrid and bitter than soot; nor can any thing be more mild and inoffensive to the palate than malt-dust, which is the germ of barley when sprouted for malting, and consists chiefly of mucilage, with a small proportion of sugar. Yet the potatoes produced with these three very discordant manures were all equally good, and in taste and flavour exactly similar. And yet, though manures may seem to have no influence on the sensible qualities of this vegetable, soil appears to have a great deal; for when cultivated on some descriptions of soil it loses, as it were, in every respect but its external form, its very identity. A potatoe, which in one soil is firm and dry, will in another be soft and watery, as though its very organization and texture had undergone a perfect change.

On what principle this is to be accounted for does not appear; nor is there any analogy, within the sphere of my observation, at least, that will furnish a solution of this difficult problem in vegetable economy. The general flavour of every kind of fruit or vegetable, if properly cultivated or not, will be the same on whatever soil it may be raised, varying only, and that perhaps but slightly, in the degree of its poignancy. No change of soil or culture can debase a nonpareil to a codlin, nor communicate to a codlin the flavour of a nonpareil, but under every change each will preserve its distinctive character.

V. *Method of Planting.*

A very common way of planting potatoes is to form the land into ridges from two to three feet wide, which are filled with manure, on which the sets are deposited, and then covered by a double-mould-board plough. Others plant them upon

the level, after every third and sometimes second turn of the plough. In both these ways there will be great irregularity. Besides, as the planters, who are generally women or children, have to exert their judgment as they go along, respecting the distances at which the sets are to be planted in the rows, they are a much greater time about the work than they would be, were they able to proceed without puzzling themselves to know when they were right, or when they were wrong.

The method I have practised, and which from experience I can recommend, is this: The land, being previously made fine by the plough and the harrow, is marked out into drills nine inches asunder. The implement I make use of for this purpose is what is called Ducket's drill-marker with five shares; an implement too well known to require a description. The drills being formed, an implement consisting of a pair of wheels, not quite twelve inches in diameter, fixed upon an axis at nine inches apart, and having on their circumference a tooth or projection at every nine inches, and so placed as that the wheels shall mark alternately as drawn along two of the drills, and makes an indenture in each drill at every nine inches. It then misses one drill, and returns. When I do not use Duckett's marker, I have two marking wheels, which occasionally fit upon the axis of the implement above described, each of which is set at nine inches from the indenting wheels. Wher the person who manages the implement returns to the right, the right hand wheel repeats its former track; when to the left, the left hand wheel. In general, however, I prefer marking out the land by Duckett's marker, the drills by that instrument being deeper and more defined than by the indenting implement alone.

The indentures being made, the planter then follows and drops in the sets, planting both drills as he goes along. In chusing the sets, large or good sized potatoes should be preferred, and only one eye left in each set.

The planting being finished, the field is run over with a bush or other light harrow, and then rolled. As soon as the young plants are three or four inches high, the ground is flat-hoed. When the plants are advanced in growth three or four inches more, the whole has a top-dressing of any manure which can be obtained suitable for the purpose, such as chandler's graves, soot, malt dust, &c. &c.

The next operation is the earthing up, which immediately follows the top dressing. The implement I make use of is M'Dougal's expanding hoe, which I have drawn by that useful, but despised animal, an ass. And here I must observe, that for an operation of this kind both the ass and the mule are particularly adapted, not only

because their feet are narrower than a horses, even of diminutive size, but because in their walk their feet follow each other in a line, so that they do not trample down the ridges, as horses are apt to do, as they go along.

As the plants stand alternately, the earth is thrown to the outside row, as well as to that which is nearest to the hoe; so that every plant gets earthed up on both sides. This operation being performed, which lays the land into twenty-seven inch ridges, having two rows of potatoes on each ridge, a careful person goes over the whole with a hand hoe to rectify any little irregularity, and give the field a neat and uniform appearance. After this the plants have no more hoeings, as I hold it injurious, when the young tubers are formed, to disturb them. It is customary to give several horse-hoeings to potatoes in the course of the summer; and when the rows are planted at wide intervals, it frequently is necessary, were it for no other purpose than to keep down the annual weeds. But at the distance which I recommend them to be planted, the tops soon spread so as to occupy the whole ground, and smother what weeds might attempt to vegetate. If chance weeds appear amongst the plants, and over-top them, they are cut down with a knife. Were they to be pulled up by the roots, there would be danger of laying bare the young potatoes.

I am aware that it may be thought the plants are too crowded, by having two rows so near together, with so small an interval between them and the next two rows: and so indeed it would be, were it not that by setting the plants alternately, each row can be earthed up on both sides. By planting them uniformly, and, as I may say, with mathematical exactness, the greatest possible number of plants are set in a given space, without loss of ground, and, what is equally as necessary, without being crowded.

In this mode of planting there will be something more than ten plants to a square yard, which is something less than a square foot for each plant.

Supposing the produce of each plant to weigh only twelve ounces, the produce of an acre will be above sixteen tons! But I have no doubt, if the potatoes are of a prolific kind, and well managed, they will produce at the distance I propose, at least one pound at each root in a favourable season. It may not, perhaps, be improper in this place to observe, that there is a circumstance in the cultivation of potatoes which, in the neighbourhood of rookeries, it is highly necessary to guard against, namely, the depredations of the rooks, both at the time of planting, and

when they are approaching to maturity, as no crop is more frequently injured by these voracious plunderers.

VI. *On the Advantage of transplanting Potatoes.*

Potatoes have a great advantage over most other crops in the latitude they admit of in the article of planting them. From the middle of February till the beginning of June, a period of nearly four months, the farmer may chuse the time most suited to his convenience for putting them into the ground. But this is not all; there is no plant which admits of being transplanted with greater success.

On May 11th, 1804, I planted six rows of the American hundred-eyes. On the 7th of June three of the rows were taken up and transplanted. The transplanted rows produced 375 *lbs.* after the rate of 1 *lb.* 9 *oz.* from each root. Those which were not removed produced 360 *lbs.* after the rate of 1 *lb.* 8 *oz.* from each root. The soil in each instance was the same. That part where the potatoes were originally planted was manured at the time of planting; where they were transplanted, a top dressing only was given.

On the 4th of June, I planted three rows of a smallish round white potatoe, and at the same time some of the same kind were planted in a nursery bed. The latter were transplanted the 1st day of July. The produce not inferior to those which had never been removed.

On the 8th of June I planted three rows of the early Scotch kidney (a very good sort, which Sir John Sinclair procured out of Scotland for the Board of Agriculture, at the time he was President), and on the same day some of the same kind were planted in a nursery bed. Those in the nursery bed were transplanted on the 11th of July. The potatoes, which were not removed, produced a fair crop; the transplanted ones were very small. They ripened, however, at the same time when the others did. I attribute their failure not so much to their having been transplanted at a late season, as I do to the operation having taken place in uncommonly dry weather. And yet, though they were transplanted under every disadvantage, in a hot dry sand, and at a time that was both preceded and followed by great drought, not two plants out of the whole number died. The potatoe, indeed, is a plant more tenacious of life, if possible, than couch-grass. I have no doubt, had the season been favourable, the crop would have equalled that which had not been transplanted.

Potatoes may also be propagated from cuttings of the haulm, which very freely take root, especially if the season be favourable.

When thus propagated, the same room should be allowed as in any other way of raising them; for though they are not quite so prolific (at least I do not find them so) as transplanted plants, yet their tops are equally as luxuriant.

My experiments on transplanting were tried on a piece of ground which had produced a crop of winter tares. As soon as the potatoes were off, it was sown with winter tares as before; and as soon as the tares are mown in the ensuing summer, it is my intention to fill it with transplanted potatoe plants again.

This practice, besides suggesting hints to the farmer, may furnish valuable information to the small cottager. It will teach him, that after his little garden has produced him a crop of spring and early summer vegetables, he may obtain from it, by being provided with a nursery bed of potatoe plants, a valuable stock of food for his winter consumption.

VII. *Taking up and Storing.*

In taking up potatoes, the first thing to be attended to is to clear the ground of the haulm, and then to gather such potatoes as appear on the surface. These, though of inferior quality to the rest for culinary purposes, are as good as the best for sets.

Potatoes are taken up either with the spade or fork, or else with the plough. The one mode is more expeditious, though in some respects more wasteful.

When taken up by the plough, supposing they are planted in single rows, a common swing plough is the best implement, which, when applied to this purpose, should work without a coulter. When the potatoes are planted in double rows, as is recommended in this paper, the proper instrument is the double mould-board plough, drawn by two horses, the horses going abreast with the ridge between them, which the double mould-board plough undermines. In performing this work it should commence by undermining only every other ridge. The produce of these being cleared away, the remaining ridges are then to be proceeded upon in the same manner.

The persons employed to gather the crop should be supplied with two, if not three baskets, for the purpose of separating those of prime and middling quality from the refuse.

Previously to their being stored, they should be spread abroad for two or three days, that they may be perfectly dry; lest when they are laid by, whether in a pit or elsewhere, they should ferment and be spoiled.

Two things are to be attended to, in storing potatoes, namely, that they are kept dry, and that they are out of the reach of frost. The most common way, where they are raised in large quantities, is to put them into what are called pies. These are trenches from five to six feet wide (the narrower the better) and usually about one deep. Their length of course must be determined by the quantity to be stored. These trenches are to be made where no wet can drain into them. The sides being lined with straw, the potatoes are laid in, and ridged up about two feet and a half or three feet high, like the roof of a house. The whole is then covered with dry straw at least a foot thick, and on that is laid the earth which came out of the trench, and as much more as may be necessary completely to exclude the frost.

The earth is carefully to be beaten down and laid with such a declivity as that the rain may not soak in.

VIII. *On the Application of Potatoes as Food for Animals.*

Much has been said and written, on the best and cheapest modes by which potatoes may be prepared as food for animals. Though I differ from most writers on this subject in supposing that simple boiling, all circumstances considered, is perhaps as cheap a way as any by which they can undergo a culinary process; yet as to boil them properly requires an attention which is not to be expected from common farming servants, I should prefer either steaming, roasting upon kilns, or baking. By any of these processes the watery particles are dissipated, without the chance or possibility of being reabsorbed, as will inevitably be the case in boiling, unless they are taken out of the water before the ebullition subsides.

It were presumption to say that where potatoes are cultivated upon a great scale, and where fuel is exceedingly cheap, and where the expence of buildings, apparatus, &c. is not an object (but where is it not an object?) potatoes may not be cooked to advantage. I am, however, decidely of opinion that it will never answer the purpose of farmers in general to adopt the practice, I mean beyond what can be done by the farmer's wife (if she will condescend to such employment) or dairy maid, in the common routine of business, without interfering with their regular work; and this could only extend to a few hogs in the stye.

The practice which I recommend is to give them raw, and in moderation, giving at the same time dry food, particularly such as will most powerfully counteract their purgative tendency.

They are found to agree with animals of all kinds best when in a growing state; for when they begin to vegetate, the saccharine matter is developed, and the juices undergo a decomposition, which in a great measure, if not altogether, disarms them of their deleterious quality.

Let a calculation be made of the expense of fuel, attendance, buildings, apparatus, &c. then let an equal sum be expended in corn and oil-cake to be given with the potatoes; and at the same time let an estimate be made of the value of the increased quantity and quality of the dung in consequence of such addition of corn or cake. When this is done, see on which side will be the balance.

The most valuable purpose to which the farmer can apply his potatoes, when he has no longer a market for them, is to give them to his sheep at those times when they are prevented by frost or snow from getting at the turnips. In this way they are applied with great advantage. Late in the season also they are an admirable resource to fly to, at that distressing period when the winter food is consumed, and before the spring-grass has made its appearance.

Potatoes are particularly serviceable for ewes and lambs. To these I give them after the rate of two, three, and sometimes four pounds, per head per day. But whether they are given to ewes and lambs, fatting, or other sheep, neglect not to supply the flock with plenty of dry food at the same time.

It is said that in Lancashire, and some other parts, it has of late years been customary to give potatoes bruised or ground, mixed with meal of some kind, or pollard, to cows and hogs. There can be no objection to this method, except the trouble of executing it. But where there are proper conveniences for the purpose, I should prefer it to any other mode, for cows especially, as there would then be no risk of their being choaked, as sometimes happens when potatoes are given to them whole.

IX. *Diseases.*

The only disease to which potatoe plants are particularly subject is what is called the curl. Its appearance and effects are too well known to need a description. About five and twenty years ago this disease was alarmingly extensive: since then

it seems gradually to have abated. Various have been the opinions concerning it, but none which carry with them complete conviction. The opinion which I lean to (and I only lean to it) is, that the disease is hereditary; in the same sense, I mean as certain diseases are said to be hereditary in certain families, which though they do not regularly appear in every generation, yet are always liable to break out on the slightest agency of the exciting cause. One circumstance which tends to favour this opinion is, that some sorts, the ox-noble for instance, were never infected with this disease. I have remarked that the sets producing curled plants seldom dissolve, coming up in autumn to all appearance in as perfect state as when first deposited in the ground.

It has been said, and if I mistake not, I once proved it by experiment, (but as it is many years since, and as I took no memorandum of the fact at the time, I cannot trust to the accuracy of my recollection) that a potatoe, which cuts hard or woody, will infallibly produce curled plants, and such as yield freely to the knife, may be expected to produce healthy ones.

X. *General Observations.*

It is a received maxim that the same crop ought not to be grown on the same land for a succession of years, under the idea, I suppose, that to bring any particular vegetable to maturity requires a specific kind of nutriment, of which in a short time the soil would be exhausted, were it to produce the same species of plant annually. There is reason to believe that this idea is erroneous. I mean not, however, to say that a rotation of crops is not in general beneficial, and in most cases even necessary.

A rotation of crops enables the farmer to repair the exhaustion of one crop, which is reaped and carried off the ground, by the interposition of another, which being manured for, and consumed upon the land, brings back as much as the preceding one had taken away. Besides, a rotation of crops, of which turnips and vegetables of that tribe make a part, gives time for eradicating couch-grass and other weeds, which will unavoidably accumulate amongst every kind of grain which admits not of garden culture. Were it practicable to cultivate even wheat, so as that the crop could be produced every year perfectly free from weeds, the same grain might be repeated ad infinitum by the assistance of sufficient manure to make good the annual exhaustion of the soil.

This reasoning is confirmed by the practice of the potatoe-farmers in Yorkshire. In Marshland, a district in that country, which supplies the London market with the greatest part of its potatoes, it is customary to plant potatoes in the same field for twenty years in succession, manuring for them every other year. No complaints are made, that the crops are less productive now, than they were formerly, or that the potatoes degenerate.

It may not be improper, however, to remark, that it is more than probable that every agricultural plant would not admit of being cultivated in the same field for a series of years, like potatoes. Such plants, for instance, as are liable to be infested by particular insects, ought not to be repeated too often in the same field; as the insects, it is reasonable to conclude, would multiply in a soil which regularly supplied them with food; for it is a natural supposition that where the insect finds its food there it will deposit its eggs, or remain buried in the ground in its larva state till the returning season.

Upon this principle, perhaps, we may account for the circumstance respecting red clover, taken notice of in many parts of Suffolk and Norfolk, namely, that the land, as the farmers there express themselves, is grown tired of it. It is not improbable that some insect, too minute for general observation, and which for a number of years has been increasing in the soil, may prey upon the young fibres of the root, or some other delicate part, so as either totally to destroy the plants, or to render them weak and sickly. Should this reasoning be conclusive when applied to red clover, which is never repeated oftener than once in every four years, it must appear still more conclusive when applied to insect-feeding plants repeated on the same soil every year.

It is generally supposed that the colour of the potatoe blossom depends upon the colour of the potatoe; that a white blossom, in short, is a certain indication that the potatoe to be produced will be white, and that the purple blossom as infallibly shews that it will be red. This, however, is a mistaken supposition; the white blossom invariably indicating that the potatoe which produces it is of the kidney kind; the blossoms of the red being only of a darker hue. There is, I believe, no instance of a true kidney-shaped potatoe being red.

Having in a preceding part of this paper spoken of the potatoe as a plant remarkably tenacious of life, it may not be improper to mention that it possesses also a principle of vitality, or self-propagation, which few persons, it is believed, suspect.

In looking over some potatoes which were going to be planted, I observed on several of them small buds breaking out where there was no appearance of an eye: these I cut out and planted, all of which grew and produced potatoes. Willing to trace this principle of vitality and self-propagation to its source, I took a certain number of potatoes, which, after paring off the rind, I cut into cubes of about an inch square. These cubes being kept in a dry place for a day or two, that they might heal over, were planted in the same manure as common cuttings. Of these, two-thirds at least produced healthy vigorous plants, and came to maturity.

How is this phænomenon to be accounted for? Do the embryo plants extend themselves in all directions from the eyes through the whole parenchymatous substance of the potatoe, converting it, as it were, into a vegetable polypus? There is nothing obvious to the eye, at least, which leads to any such hypothesis.

Had this plant and its properties been known to the Egyptians, they would, probably, have consecrated it to their principal divinity, not only on account of its important application to the sustenance of human life, but as a symbolical instance of the mysterious obscurity of nature in the generative process, to which their mythology is perpetually allusive, and as an emblem of fecundity.

Potatoes, for domestic purposes, are best taken fresh out of the ground as they are wanted. Those persons, therefore, who are particularly curious in having this vegetable in its highest state of perfection, should have them taken up only as they are called for. It seems needless to observe that before winter sets in, they should be carefully covered over with straw, or any other protecting substance, to secure them from the frost.

It may not be amiss to mention, that potatoes for the table are much improved by being boiled in milk, especially if they are of the watery kind. The reason seems to be, that milk requiring a greater degree of heat to bring it to the boiling point than the watery part of the potatoe, the watery part of the potatoe is exalted into vapour and expelled before the milk boils; and even should the potatoe remain in the vessel, which it ought not to do after the ebullition ceases, it would absorb, and be saturated by the milk only, receiving back none of its own juices, as it would have done in part, had it been boiled merely in water.

It may, perhaps, be unnecessary to observe, that to give a minute detail of all the various modes of cultivating potatoes, which have been adopted in different parts of the kingdom, makes no part of the business of this Essay. Had such,

indeed, been my object, I might have compiled and put together nearly as many volumes as I have now written pages, and (the manual labour excepted) with as little trouble. But such an occupation would have been a needless waste of time, a mere repetition of what has been repeatedly communicated to the public already. I thought it sufficient, therefore, to describe those modes and operations which have had the preference in my own practice: some of which, so far at least as I have seen or heard, are peculiar to myself. It has not, however, been from any affectation of singularity that I have in any instance deviated from established customs or opinions. In agriculture, as in all other arts, those practices only are worth adopting which have utility for their basis. Of that, which has no other title to notice than its novelty, it is a slender commendation to say that it is new.

No. XV.

On the Subject of Weeding; or the Improvements to be effected in Agriculture by the Extirpation of Weeds. By Mr. William Pitt, *of Wolverhampton.*

THE cleaning of all kind of crops, and keeping them free from weeds, is an essential part of cultivation; which if omitted, neglected, or but partially performed, a part of the cultivated crop will be lost, in proportion to the prevalence of such weeds, from defective preparation, or partial extirpation; for the nourishment drawn from the ground by the roots of all vegetables being somewhat similar, where that nourishment is suffered to be drawn by weeds it is lost to the intended crop, which will therefore be reduced in produce in proportion as it has been deprived of nourishment, and prevented from occupying its whole extent of ground.

The same observation will apply to pastures, to hedges, and plantations, and to all parts of the earth's surface reclaimed, occupied, and cultivated for the use of man; for therein the growth of noxious or useless plants will be injurious to the success of the useful ones, and in proportion as the former abound, the latter must prove defective.

The cleaning of a crop from weeds must be effected in two ways: 1. In the preparation; and 2. During the growth of the crop. In the preparation, attention must be given to distinguish root weeds from seedlings, as their destruction must be effected upon different principles.

The vegetables we term weeds, are more hardy and tenacious of growth than any others; nor indeed can it be otherwise than that those plants, which succeed in spite of opposition, must be of the most hardy kind. The production and growth of weeds is equally consistent with the Divine goodness with that of the most valuable plants, for myriads of diminutive creatures, enjoying life and animation, are supported by them, and to whom they are a more natural prey than the dietetic plants of mankind: and man, possessed of reason, reflection, and intelligence, has powers and abilities to select and cultivate such vegetables as are adapted to his use, and proper for his sustenance, and to destroy and extirpate others; and thus to appropriate to himself what proportion he thinks proper of the earth's surface; which if

he neglects to dress and cultivate properly, it will, in some degree, revert to its natural state, producing the hardier and more acrid plants for the sustenance of numberless tribes of insects, and for an infinity of other known and unknown uses; and indeed were it otherwise, the indolence of the human race might, in some measure, suspend the bounty of Providence, and the fertile parts of the earth's surface, instead of being covered with an universal verdure, would, by indolence or neglect, be rendered little different to the sterile and barren desert.

The plants we term weeds, considered as respecting mankind, are not totally useless; many of them have valuable medical qualities, and some of them may be applied to uses so as to pay something towards the expence of clearing them from the ground: thus, sowthistles are good food for rabbits or hogs: the hog-weed *(Heracleum)* is good for either hogs or cattle: horses are said to be fond of young thistles when partially dried, and the seed may be prevented from spreading by gathering the down, which makes good pillows; however there is some danger in trusting them to this stage of growth, as a high wind would, and frequently does, disperse them over a whole country. Chadlock, when drawn, may be given to cows, who are very fond of it, particularly of the smooth kind; and in the Oxford Report it is stated that it can be converted into good hay.

Nettles, fern, and the more bulky hedge-weeds, are, in Staffordshire, collected annually about Midsummer, and burnt; their ashes being afterwards formed into balls, which are of considerable value, being used in composing a ley for scouring and cleaning linen and other clothes.

It is said that pigeons are of use in picking up the seeds of many weeds that would otherwise vegetate; and I have no doubt but a prodigious quantity of the seeds of weeds are eaten by small birds, particularly of most of the lake-weeds *(Polygonums)*, of the spurrey *(Spergula)*, and, in severe weather, of the different sorts of chadlocks *(Sinapis, Brassica*, and *Raphanus)*, and of many other kinds.

It has been observed, that bees have not thriven so well in this island since the extirpation of weeds has been more attended to.

In Japan, and in China, (it is said) not a weed is to be seen; and that they only make use of night-soil as a manure, partly with a view of preventing any risk of weeds.

Weeds, like all other vegetables, may be distinguished into annuals, biennials, and perrennials, according to their term of duration.

Annuals are those which continue only one year, the plant dying after perfecting their seeds: these are generally very prolific in seeds.

Biennials are those which continue two years, and die after perfecting their seeds the second year: these are also prolific in seeds.

Perrennials are those which continue many years; some of these perfect their seeds every year, and others being very tenacious of growth by their roots, and having the faculty of reproducing themselves in this way, are less prolific in seeds; but many of them increase both by roots and seeds.

A list or catalogue of weeds, or plants injurious to cultivation, formed by a person whose observations have been chiefly confined to a local spot, must evidently be imperfect, as many kinds common and noxious in other places may be unobserved there, and omissions will be the consequence; this may be, in some measure, the case with this Paper, for though the writer of it has seen many other parts of the kingdom than his own neighbourhood, yet he may not have examined them particularly enough to be minutely acquainted with their spontaneous productions; additions will therefore be wanting from observations made elsewhere.

The following is a list of weeds or plants injurious or noxious to cultivation, or cultivated land, principally observed by the writer hereof, growing in

I. Gardens,
II. Corn-fields,
III. Meadows and pastures,
IV. Waste and uncultivated land,
V. Hedges,
VI. Woods and plantations;

with some observations on their injurious tendency, methods of extirpation, and instruments made use of for that purpose.

I. *Garden Weeds, are,*

1. Couch grass, or, as here called, squitch; the roots of the hardy perrennial grasses, extremely tenacious of growth; they are the dog's grass *(Triticum repens)*, the white bent grass *(Agrostis alba)*, and the tall oat grass *(Avena elatior)*. The distinction between these grasses is very observable in their flowering stems, and in the ears or awns containing their seeds, which are as separately distinct as those of the different kinds of grain; moreover, the latter *(Avena elatior)* has a bulbous

jointed root, which affords shelter to various destructive grubs, worms, and insects; there cannot therefore be too much pains used to destroy them: they are to be destroyed in gardens by carefully picking out the roots in digging, and as carefully rooting up whatever remaining fragments of the roots may send out a shoot above ground; the roots of the two former are so very vigorous and tenacious of growth, that they will even perforate a potatoe: if they are suffered to get a head they will form a perfect matting beneath the surface, and a green carpet above, to the almost total extermination of any other plant; they cannot, therefore, be suffered where any other plant is cultivated.

2. Suffolk grass, dwarf meadow grass *(Poa annua)*, almost harmless in its roots, but increasing so rapidly and abundantly by its seeds, as soon to occupy the whole extent of ground near it, if not timely prevented; common in gravel walks and pavements, or other spots where the surface is not repeatedly disturbed by the spade or hoe; so very prolific in its seeds, that it will produce and reproduce itself four times in one summer: may be destroyed by taking care to root it out before its seeds are perfected and shed, otherwise the vegetation will be so abundant as almost to bid defiance to the weeders. Mr. Curtis recommends scalding it with boiling water, as the most expeditious method of destroying it. This, though a garden weed, is a sweet and good grass in pasture land.

3. Catchweed, goosegrass, cleavers, in Staffordshire commonly called hariff *(Galium aparine)*, more common in hedges than amongst a crop, but if the seeds are permitted to shed will become troublesome, as they are numerous and productive; leaves rough, so as to draw blood from the tongue by once or twice gently drawing along, as I have seen experienced; may be easily destroyed in gardens by drawing up before the seeds are perfected. Young geese are very fond of the branches of this plant; the seeds may be used instead of coffee; the expressed juice of the stem and leaves, taken to the amount of four ounces night and morning, is very efficacious in removing many of those cutaneous eruptions, which are called, though improperly, scorbutic; but it must be continued for several weeks. These observations from Dr. Withering.

4. Garden nightshade *(Solanum nigrum)*, common in gardens near Brompton and Chelsea (as observed to me by Mr. Curtis), but seldom found in the country; though I have found it on dunghills. Being an annual plant, it must be destroyed by rooting up before its seeds are perfected.

5. Goosefoot, wild orache *(Chenopodiums album, viride,* and *hybridum)*, common and luxuriant in our gardens, very prolific in seeds and in produce therefrom, if not rooted out before the seeds are scattered on cultivated land, they being very hardy and tenacious of growth. Like all other annual seedlings to be destroyed only by rooting up.

6. Wild orache, fat-hen *(Atriplex hastata)*, nearly allied to the chenopodiums, from which it is only distinguished by some of the flowers having only pointals, whilst others on the same plant have both chives and pointals, in common with the chenopodiums: flowers small, so that this distinction can only be ascertained by the microscope growing on rubbish, dunghills, and in kitchen gardens; an hardy annual, very fertile in seeds; to be prevented or destroyed by the same precaution recommended for the last. It is sometimes gathered as a potherb, and eaten in lieu of spinach and other greens. Withering.

7. Fool's parsley, lesser hemlock *(Æthusa cynapium)*, common in our gardens, and in its early growth resembling parsley, for which it is often mistaken, and when eaten it occasions sickeness: if the curled-leaved parsley alone was cultivated, no such mistakes would happen (Withering): when running to seed it detects itself, in that state differing much from parsley; it should then be rooted out.

8. Knot grass *(Polygonum aviculare)*, sometimes growing on gravel walks, trailing a considerable length in all directions, very prolific in seeds; care should therefore be taken to root it up before the seeds ripen: hogs are fond of it.

9. Ground ash *(Ægopodium podragraria)*, described to me by Mr. Curtis as a very troublesome weed in gardens near London; but as far as I have observed it confined mostly to the shade of hedges; the leaves may be eaten early in the spring with other potherbs. (Withering). The plant is I believe perennial, and should be prevented gaining a footing in land intended for other crops.

10. Chickweed *(Alsine media)*, sometimes growing with great rapidity, and luxuriance, on land much pulverized by operose cultivation; an annual plant, very productive of seeds, and where it abounds it is perhaps improper to give the land a fine culture till it in some measure disappears; the young shoots and leaves, when boiled, can hardly be distinguished from spinach, and are equally wholesome: swine are extremely fond of this plant, and it is a grateful food to linnets, to the canary bird, to other small birds, and to young chickens. Withering.

11. Black bind weed, here called bearbind *(Polygonum convolvulus)*, a para-

sitical plant, often climbing up beans and other garden plants, hardy, and extremely prolific in seeds, of which one plant will sometimes produce many hundreds; if the ground be meant to be kept clean of this plant the seeds should never be suffered to shed: the seeds contain a fine white flour, and are good for pigeons, poultry, and small birds.

12. Spurge devil's milk *(Euphorbia)* chiefly I believe the sun spurge *(Euphorbia helioscopa)*, an annual plant, not very troublesome, nor difficult of eradication, yet not uncommon in gardens, where I believe it would soon become extinct, if attention were paid to root it out before its seeds were scattered.

13. Red dead nettle, or dee nettle *(Lamium purpureum)*, called an annual plant by Linnæus, and a perennial by Hudson; common in our gardens, and flowering early, and a greater part of the year; the growth doubtless principally from seeds, which therefore should not be suffered to shed. Withering observes that the young leaves may be eaten as a pot herb, but I believe they seldom or never are in this country.

14. Henbit *(Lamium amplexicaule)*, an annual garden weed, which should be weeded out before its seed are perfected.

15. Nettle hemp *(Galeopsis tetrahit)*, a luxuriant and disagreeable garden weed, which should be rooted out in time.

16. Garden sow thistle *(Conchus oleraceus)*, common, and of luxuriant growth. The seeds of this plant should never be suffered to shed in any situation, for being furnished with feathers, they fly over a country with the wind, and vegetate on the first loose or cultivated ground they settle on. The plant will pay for drawing out of a garden, being a favourite food with rabbits and hogs: the leaves are good amongst other pot herbs. Withering.

17. Fumitory *(Fumaria officinalis)*; common but not very injurious; an annual plant, which may be destroyed by preventing its seeding. Hoffman prefers the expressed juice of this plant to all other medicines, as a sweetener of the blood; the dose is two or three ounces; an infusion of the leaves is used as a cosmetic, to remove freckles, and clear the skin. Withering.

18. Common thistle *(Serratula arvensis)*; seeds numerous, and furnished with feathers to fly any distance before the wind, on which account they are liable to grow in gardens, though ever so much pains may have been used in their eradication, which when the case, they should be drawn up by the roots in moist weather with tongs, for they cannot be handled. The suffering of the seeds of this, and many

other weeds to ripen and shed (particularly of the class *syngenesia*), is not only a private neglect but a public nuisance, as they will propagate themselves to any distance by means of their feathers, which keep them afloat in the air, and they are wafted about by the various currents of wind till, by degrees, the feathers no longer supporting them, they are deposited in the crevices of loose or cultivated land, where they vegetate, and produce a plentiful crop, to the surprise of many, who wonder by what means they came there. I have frequently observed a fresh bank of earth dug from the bottom of a canal, produce plentiful and vigorous crops of thistles and coltsfoot, and some people who have seen it have fancied that the seeds or fibres of these plants had been concealed in the earth, not knowing, or not considering that the seeds had been flying in the air, and that an elevated bank of earth was more liable to arrest their progress than the flat even land; as well as that the seeds were more likely there to vegetate, and produce a crop, than on a matting of turf.

19. Groundsel (*Senecio vulgaris*), another very common garden weed, with seeds feathered as before, and capable of spreading themselves far and near, with this farther chance of propagating themselves, that the plant is extremely quick of growth, insomuch that after clean weeding a garden, walk round it in a week or two, and you may be surprised to find many plants of this kind, with the seeds ready to take flight. The eradication of this weed can only be effected by constant and unremitting attention; the plant, with its seed bud, is very acceptable to small birds confined in cages.

20. Common nettle (*Urtica dioica*), generally growing in hedges or shady places, but sometimes appearing elsewhere, when it must be destroyed by rooting up; the young shoots are gathered in spring to boil in broth; the leaves cut may be mixed with the food of turkies and other poultry. Withering.

21. Mistletoe (*Viscum album*), very common on fruit trees near the Severn, and in many other places, and when gotten to a head said to be very injurious in preventing their bearing; it should, therefore, be plucked off in time.

22. Lastly, I shall add the cultivated potatoe (*Solanum tuberosum*), which, however valuable as a crop, is very apt to remain in the ground, and intrude amongst other after crops to their injury, as well as having a slovenly appearance: this inconvenience is doubtless owing to want of clean getting up the crop; but it is very difficult to get up the crop perfectly clean, and every small root, or part of

a root, having the eye or sprout in it, will vegetate if it escapes the winter's frost. As it is now found that the shoots of the potatoe will crop well after transplanting, it seems the better way to draw them from among other crops as they appear, taking the advantage of showery weather, and transplant them into a bed by themselves, where they may succeed some early crop, as winter greens, spinach, early cabbages, &c. by which means your other crops may be cleaned, and potatoes raised without any expence of seed.

These are the principal intruders into the garden, as far as observed by the writer hereof, but many other sorts will occasionally appear from seeds wafted by the wind; as well as be introduced by using raw dung, particularly of hogs and horses, which often contain seeds possessing their vegetative power, and the litter intermixed therewith often contains more. This shows that raw dung is very improper for a garden, but it is often used, particularly for early or other potatoes.

Much labour in weeding will be saved by particular attention in drawing up all seedlings in time, and before they have sown their seeds; for the increase of many weeds in this way is beyond calculation, and the precaution of preventing their seeding should, therefore, never on any account be neglected.

The tools principally used in the gardens of Staffordshire, for destroying weeds, are, the spade, the three-fanged fork for cleaning out root weeds, and the different kind of hoes, of which the Dutch hoe is used for scuffling over the surface, and the common hoes, of a triangular or parallelogram form, for cutting up weeds, moulding up growing plants, and loosening the surface: these tools are, I believe, very general, and known every where.

II. *Weeds in Corn Fields and Arable Land.*

I think it needless to bestow much time on neutral plants, or such as are not decidedly injurious; many of these, therefore, to be found in arable pastures, will not be mentioned, and others, of a more suspicious character, only slightly touched upon; whilst more particular attention will be paid to the vigorous and luxuriant weeds which infest our corn fields, as follows:

1. Ivy-leaved chickweed *(Veronica hederifolia)*, sometimes very much abounding amongst wheat very early in the spring, but seeding and leaving the ground early, perhaps not much injuring the crop; the seed is said to ripen in 28 days from the first vegetation of the plant, which appears in March, and often gives a

plentiful produce of seeds, which will lay in the ground many years, ready to vegetate next time the land is pulverised early in the spring; this should, therefore, be done in the fallow, which would occasion the seeds to vegetate, and the plant might be destroyed by ploughing under before its seeds ripen.

2. Lambs lettuce, corn salad *(Valeriana locusta)*. This plant I never observed till last summer, when I certainly believe it was more plentiful than common in this neighbourhood. I observed it on my farm, both in corn fields and arable pastures, but not in such quantity as to be injurious. In a hard tilled field near Lichfield, I found it in great abundance; it is an annual plant, not at all formidable as a weed; it is eaten as a salad, and by cattle; for the former purpose little inferior to young lettuce. See Withering, and *Flora Rustica*.

3. Dogs grass—*Triticum repens.*

4. Bent grasses—*Agrostis' alba* and *stolonifera.*

5. Tall oat grass—*Avena elatior.*

6. Creeping soft grass—*Holcus mollis.*

The roots of those, and perhaps of some other of the hardy perennial grasses, compose what the farmers call quick, couch, or squitch, that plague and curse to arable cultivation; they are sometimes so interwoven together in the soil, in land that has been under hard tillage and bad management, as to form a perfect matting and to choke the plough: they abound most in light and mixed soils, not equally infesting strong clays: the first of these, the dogs grass, has been generally referred to by writers, as alone producing couch or squitch, but this idea is now generally known to be erroneous; this grass principally abounding in hedges and gardens, though sometimes plentiful in arable fields, yet not one-tenth part of the squitch of arable land is produced by this grass. The most general arable land squitch grass is of the Agrostis family, but to which particular species that most complained of by farmers belongs, is not yet agreed amongst botanists. Dr. Stokes refers it to the fine bent *(Agrostis capilaris)*; Mr. Dickenson assures me it is a variety of the *Agrostis alba*; but Mr. Curtis informed me, in London, that this squitch grass has never yet been rightly specified, that it ought to be termed *Agrostis repens.* I have frequently observed the ear or awn of this grass to have the general habit of the Agrostis, and it is very probable that more species than one of this genera have the habit of running in the roots, and producing couch or squitch.

The creeping red stalked bent grass *(Agrostis stolonifera)*, and the creeping soft grass *(Holcus mollis)*, are commons quitch grasses on strong or cold wet lands; the tall oat grass *(Avena elatior)*, is a very common squitch grass, on the light gravelly soils of this neighbourhood; its roots are composed of a bunch of bulbs, affording shelter to pernicious grubs, worms, and insects; it is difficult of eradication, and very pernicious to a crop, particularly in wet seasons.

These grasses, though so troublesome and injurious on arable land, are yet, probably, good meadow grasses, where their roots are not so liable to run as on arable land, loosened, broken, and pulverised by tillage.

With regard to their destruction on arable land, it can only be effected by giving an early and complete spring and summer fallow, by repeated ploughings in hot weather, with sufficient harrowings between each ploughing to work out the squitch and bring it to the top; and unless the summer prove dry for some length of time, even this will be insufficient, in which case many active industrious farmers have it forked together by hand and burnt; others carry it in heaps to rot; and I have known it mixed with quick lime, which is to be commended: it should, however, be observed, that the great increase of the roots of these grasses is occasioned by hard tillage, or bad management, and often by both.

7. Wild oat, hover *(Avena fatua)*, common on hard tilled land, and when abundant, very unsightly and injurious to a crop. Dr. Anderson observes, that this plant abounds so much in the corn fields in most parts of Aberdeenshire, as in many cases to constitute nearly one half of the bear crop (bear is the six rowed barley, *Hordeum hexastichon*, which is much grown in Scotland); it may be destroyed by the turnip culture, or by well managed early fallowing; and prevented by short tillages, and frequent seeding down to grass. It never occurs, I believe, in any considerable quantity, where there is good systematic management, and due attention to clean seed: the awns are used for hygrometers, and the seeds instead of artificial flies, in fishing for trout. Withering, and *Flora Rustica*.

8. White darnel *(Lolium temulentum)*, often found in a wheat crop, but I believe always produced from seed sown with the wheat, to prevent which, great attention should be paid to clean seed, and particularly that it contain none of this plant, it being extremely prolific, very injurious to a crop when growing, and to its value at market: it is an annual plant, which I never recollect to have seen grow, except in a crop, and very rarely there without neglect in management; the seeds

in considerable quantity, ground into flour with wheat, and the bread eaten hot, is said to be produce deleterious effects on the human body; and if malted with barley, the ale soon occasions drunkenness. Withering.

9. Goose grass, catchweed, cleavers, here called hariff *(Galium aparine*, and *spurium)*, seeds roundish, rough, two from each flower, so large as not all to be easily separated from the grain in dressing. I have known this plant very troublesome in a wheat crop, twining and crawling up the straw or stem: it is not very common in well managed crops, but more generally confined to hedges.

10. Field scabious *(Scabiosa arvensis)*, found in corn fields and pastures, but not much abounding.

11. Parsleypiert *(Aphanes arvensis)*, a diminutive weed of small account, but sometimes rather too much abounding; might, probably, be weakened by very early in the spring pulverising the land when in fallow, and ploughing the plant under in due time.

12. Dodder *(Cuscuta Europæa)*, a parasitical weed, of which I have not much experience, but am informed by Mr. Dickenson, that it is not uncommon in his neighbourhood. Some years ago, in travelling through Buckinghamshire, I observed this plant twining round the stems of a bean crop, and brought away a specimen; it climbs in a spiral direction round the stems, from which, by means of vessels, it draws its nourishment, and must, consequently, very much fret and injure any plant to which it is attached: it is called (as stated somewhere in Young's Annals), beggar weed, hell weed, and devils guts, names which sufficiently shew in what estimation it is held by farmers. The plant is annual, and produced from seed, which takes no root in the earth, but in its foster plant.

13. Corn bindweed *(Convolvulus arvensis)*, another troublesome parasitical weed, often growing amongst wheat, and when abundant, twining round the corn, and very much injuring the crop: when wheat has been laid by heavy rain, I have observed this plant increase in growth so as to hold it down fast, and prevent it rising again; it is not so common here in Staffordshire as I have observed it in some of the counties nearer London, from whence we are in the habit of procuring seed wheat; on which account I have sometimes feared we should import it more abundantly by this means, but have since observed that the seed is small and easily dressed out; the plant is perennial, and much addicted to running in the

root. Mr. Curtis has proved, that cutting it off, even below the surface, only tends to spread it farther: it must be destroyed by fallowing, and using the same process as for squitch.

14. Wild carrot *(Daucus carota)*, common, and sometimes troublesome in dry land; a biennial plant, producing seed plentifully; this, in its cultivated state, is the well known garden carrot (Withering); but Miller informs us, that he could never improve the wild carrot so as to render the roots in any degree comparable with the cultivated carrot; the seeds have been used as diuretic and carminatives, and are highly recommended in fits of the gravel and stone (Withering). Miller says, the shops have been supplied with old seeds of the garden carrot, instead of fresh ones of the wild carrot, to be used medicinally. *Flora Rustica.*

15. Shepherd's needle, here beggar's needle *(Scandix pecten)*, sometimes abounding in hard tilled land, and its seed not easily wholly separated from grain in dressing. It is a small annual plant, producing a plentiful crop of seeds; each seed furnished with a spike or beak from one to two inches long, whence its name of needle: it seldom abounds in well managed land.

16. Chickweed *(Alsine media)*, sometimes troublesome in a crop on land rendered fine by tillage, from which it should be rooted out. The Rev. Mr. Shaw remarks, that chickweed is an excellent out-of-door barometer: when the flower expands boldly and fully, no rain will happen for four hours or upwards; if it continues in that open state, no rain will disturb the summer's day; when it half conceals its miniature flower, the day is generally showery; but when it entirely shuts up, or veils the white flower with its green mantle, let the traveller put on his great coat, and the ploughman, with his beasts of draught, rest from their labour.

17. Curled dock *(Rumex crispus)*: this plant should never be suffered to shed its seed on any land, but should be rooted up and carried off in time: in arable land, the roots should be carefully picked off during the tillage, or they will produce vigorous luxuriant plants, drawing much nourishment from the soil, to the injury of the intended crop. The plant is a hardy perennial, very tenacious of growth by its roots, and producing a wonderful increase of seeds; too much caution cannot be used in avoiding sowing it, nor too much pains bestowed in its extirpation: it is the pest of clover fields in Norfolk. Withering.

18. Arsmarts, or lakeweeds *(Polygonums persicaria* and *pensylvanicum)*,

abound most in wet seasons on moist lands; and being hardy annuals, producing a plentiful crop of seeds, are apt to shew themselves in crops of grain: to be destroyed by fallowing, by draining, and by rooting out.

19. Knott grass *(Polygonum aviculare)*; a trailing plant; flourishes most by road sides and on gravel walks: out of the smothering of crops, very prolific in seeds, which are eaten by small birds.

20. Black bindweed, bearbind *(Polygonum convolvulus)*; a parasitical plant, twining round any thing it can lay hold of; very productive of seeds, which, being angular, are not easily separated from grain in dressing or winnowing. This plan is not much approved by the Staffordshire or Shropshire farmers, who are very cautious of sowing it. It is nearly allied to the buckwheat *(Polygonum fagopyrum)*, to which it is preferred by Dr. Withering, in the following words: "the seeds are quite as good for use as those of buckwheat, are produced in greater quantity, and the plant bears cold better."

21. Knawell *(Scleranthus annuus* and *perennis)*; a diminutive plant, but prolific in seeds, and of vigorous growth; have often found it on a piece of poor thin soi on my farm when in tillage, but do not think it very pernicious: it may, probably be weakened or destroyed by an early spring working of the land when in fallow.

22. Bladder campion *(Cucubalus behen)*; common in wheat and barley crops, and growing in tufts, many stalks from each root, which, when the case, should be rooted out by hand: it is a perennial plant, and has the habit of increasing from its roots.

23. Cockle *(Agrostemma githago)*, a luxuriant, vigorous, annual plant; perfecting many seeds, and drawing much from the soil: care should be taken not to sow this injurious weed. The seeds are so large that they cannot all be dressed from the grain, the plant should therefore be plucked out by hand before the seeds ripen.

24. Red and white campion *(Lychnis dioica)*, perennial weeds, growing in hedges, corn-fields, and pastures; to be weakened or destroyed by well managed fallows.

25. Mouse-ear *(Cerastium arvense)* has somewhat the habit of chickweed, but of a duller complexion; frequent amongst corn and in pastures.

26. Corn spurrey, or yarr, *(Spergula arvensis)*; frequent in corn-fields, not very bulky or luxuriant, but quick and tenacious of growth, and producing seeds plentifully: as it is of humble growth, I have never observed it to be very injurious to a crop; but Dr. Anderson observes, that in Aberdeenshire it is a pernicious weed,

growing in such abundance among the crops as to choke the grain; he has often seen it so thick, that over a vast extent of surface you could not have put down a pin without touching a plant, and the farmers there think it indestructible: he says farther, " I had remarked, that whenever any of the land had been poached, by being used as a road, especially in wet weather, no spurrey appeared there; it was evident this was occasioned by the clods thus produced not giving room for the small seeds to germinate freely; if, therefore, I could contrive to bring the ground into a cloddy state when sown, I should be free of it for this crop. I had lost a crop of bear, (six-rowed barley, *Hordeum hexastichon)*, in one field by it entirely. The soil was in a loose, mealy, incoherent state; I resolved to delay ploughing it next season as long as possible, and to plough it when it was very wet. Fortunately it came a violent rain in the beginning of March; it was ploughed when nearly in the state of a puddle, it turned over more like mud than soil; dry weather succeeding, this mud bound a little on the surface, and produced a kind of clod; the corn was sown, it got a very slight harrowing, barely to cover the seeds, in an imperfect manner, and to leave the field as rough as possible: no yarr appeared, and the crop was one of the most luxuriant I had ever seen." Thus far Dr. Anderson.

Small birds are very fond of the seeds of this plant, it is therefore probable that the surface of the ground laying undisturbed through the winter, a large proportion of the seeds would be devoured by them; I believe in all cases of a stubble very full of small seeds, it is well to defer the ploughing as long as it conveniently can be on this account. Respecting land rendered over fine by tillage, it is well understood by Staffordshire farmers to be a fault, and that it is much better left only knappy, as they call it, that is, in small lumps; this is attained in fallows by working the land early in summer, and letting it lay to consolidate through the latter part of it; and in the turnip culture by the treading of sheep and cattle, and is one great reason why land should not have too many ploughings, but only a sufficient number, judiciously timed; but ploughing in general, particularly of broken land, is much best done whon the land is dry. W. P.

27. Base rocket *(Reseda lutea)*: I observed this plant amongst some corn in Gloucestershire in the summer of 1795; it is an annual plant, not very much abounding.

28. Dwarf spurge *(Euphorbia exigua)*; common in corn fields, but generally in single plants, and not very injurious to the crop.

29. Corn poppy *(Papaver rhœas)*, an annual plant, producing numerous small seeds, sometimes very abundant in corn-fields, and a pretty sure indication of a light crop. Query, is the lightness of the crop occasioned by the abundance of this plant, or the increase of this plant encouraged by the lightness of the crop? Probably both: in a full crop it is scarcely to be found; its flowers appear in July. It might, doubtless, be weakened or destroyed in fallows, by encouraging an early vegetation in common with other seedlings.

30. Corn crowfoot *(Ranunculus arvensis)*; sometimes very abundant and injurious to a wheat crop on strong moist land: an annual plant of early growth, which can only be brought into vegetation in the fallow by an early tillage; otherwise the growth of the seeds is deferred to the next spring, to the great injury of the crop. It is observed in the *Flora Rustica*, that "in some countries it has the name of hungerweed, whence it is supposed to indicate a barren soil." The orthography, however, is not derived from the nature of the soil, but from the hungry prospect it holds out to the farmer.

31. Dee nettle, dead nettle *(Lamium album* and *purpureum)*, much abounding amongst crops on some lands, particularly in moist seasons; being perennial plants produced both from seeds and roots, great pains should be used in their extirpation.

32. Calves snout *(Antirrhinum orontium)*: I observed this plant not uncommon amongst corn crops in Hampshire in the summer of 1795, and being in some doubt about it, sent a specimen to Dr. Withering for his investigation. A poisonous plant: (Linnæus). It appears from Withering's Botany, that other specie of this genus are also common in corn-fields; as the sharp-pointed fluellin *(Antirrhinum elatine)*, the round-leaved snap dragon *(Antirrhinum spurium)*, the corn snap dragon *(Antirrhinum arvense)*, the least snap dragon *(Antirrhinum minus)*; these I have not personally examined; they are all annuals; whilst the other species of this genus, common in hedges and on walls, as the *Antirrhinum cymbalaria, ripens, linaria*, and *majus*, are hardy, and strict perennials.

33. Shepherd's purse, shepherd's pouch *(Thlaspi arvense, campestre*, and *bursa pastoris)*; well known as sometimes troublesome weeds on arable land: annual plants, of early appearance, and continuing great part of the year. To be destroyed by early and well managed fallowing, or by rooting up.

34. Whitlow grass *(Draba verna)*.

35. Codded mouse-ear *(Arabis thaliani)*. Both these are small diminutive

weeds, appearing amongst corn early in the spring; but being quick of growth and soon exhausted, are not of much consequence.

36. Smooth-leaved chadlock *(Brassica napus).*

37. Rough-leaved chadlock, or wild mustard *(Sinapis arvensis).*

38. Pale-flowered chadlock, or wild radish *(Raphanus raphanistrum).*

These three plants are confounded together by farmers, under the general name of chadlock, pronounced here kedlock, though they are as different and distinct, to the investigating botanist, as wheat, barley, and oats. They are all extremely common, and nearly equally so, if a large range of country be examined; though the different sorts are more or less abounding in different places; in this neighbourhood I can generally gather the three sorts in the same field, but the mustard is much more abundant; in the neighbourhood of Lichfield, where chadlock is indeed very abundant, it is almost universally wild rape. Some years ago I observed in the common fields of Rutlandshire, the whole surface was tinged over with the flowers of the wild radish: they are all great nuisances, and, when suffered in abundance to ripen their seeds, must draw much from the soil, to the great injury of the crop; and as they are very quick of growth, and perfect their seeds expeditiously, it is not uncommon for these plants to shed their seeds at the rate of several bushels per acre; and as it is well known that the seeds will vegetate after laying many years in the ground, it is no wonder they should produce a plentiful crop; yet, being simply annuals, they are not difficult of destruction, if due attention and proper means be used. To destroy these, as well as all other seedlings, the land in tillage should be pulverized early in the spring by ploughing and harrowing, after which, rain and warm weather will soon cause all the seeds to vegetate that are near the surface; they may be permitted to grow till they begin to flower, then plough them in, and again harrow the land, and the next rain will cause most of the remaining seeds to shoot; which must in due time be ploughed under as before; and if any should afterwards appear amongst the crop, they should be hoed or hand wed out; by this means, in one or two tillages, these plants may be totally eradicated; but if they are permitted to shed their seeds, their increase cannot be wondered at, when their prolific nature is considered, as well as the extreme hardiness of their seeds. The seeds, when dressed from grain, have, I understand, been frequently manufactured into oil.

39. Wild rocket *(Brassica muralis)*. It is observed, in some one of the county

Reports, which, for want of an index, I cannot now refer to, that this plant has made great progress in their corn-fields, and is considered as a very formidable weed. All the parts of this plant are considerably acrid, and have a rank disagreeable smell, whence it is called by the farmers who have it, *stinkweed.* It may, doubtless be destoyed by the process above recommended for chadlock.

40. Fumitory *(Fumaria officinalis)*; not uncommon in corn-fields, but not very pernicious: an annual plant.

41. Rest harrow *(Ononis arvensis* and *spinosa)*; not uncommon in arable lands where there are no very desirable plants. The *arvensis* is common in this country amongst corn, and an hardy perennial plant; if the root can be destroyed in the fallow, there is little danger from the seeds: the roots are so strong as almost to stop the plough, unless the team be pretty strong. The *spinosa* I have often seen at a distance from hence, but it is unknown in this neighbourhood.

42. Tare *(Ervum tetraspermum* and *hirsutum)*. The tare is a terrible enemy to a wheat crop, where it abounds in considerable quantity; "in wet seasons whole fields of corn have been overpowered and wholly destroyed by it." Withering. Care should be taken that seed wheat be perfectly free from tares; and all land subject to it, should if possible be got so forward in the fallow, as to bring on the vegetation of this plant previous to sowing the wheat; the seeds are good food for pigeons, and poultry.

43. Melilot *(Trifolium melilotus officinalis)*, a very injurious corn-weed in many parts of the kingdom. Mr. Miller, marks Cambridgeshire, and Gerard, Essex, for abundance of it. I have heard of it in Bedforshire, and seen it amongst corn in Gloucestershire, and Rutlandshire; in the latter county I was informed that five or six shillings per acre has sometimes been expended in weeding it out, without effecting the purpose, W. P. There cannot be a worse weed among bread corn, for a few of the seeds ground with it spoil the flour, by communicating their peculiarly strong taste; *Flora Rustica.* It flowers in June, and July, and the seeds ripen with the corn; it is probably capable of propagating itself, both by its roots and seeds, but might doubtless be much weakened by proper fallowing: horses are very fond of it; cows, sheep, and swine eat it, and bees are very fond of the flowers, it is therefore, though a corn weed, a good pasture plant.

44. Sow thistle *(Sonchus arvensis)*, a perennial weed, common amongst corn, which when it occurs ought to be drawn up by hand, before it ripens its seed;

which being furnished with feathers, would otherwise fly over the whole country.

45. Common or way thistle, cursed thistle, or saw wort, *(Serratula arvensis)* universally called thistle, but arranged by Linnæus, not as a *Carduus*, but a *Serratula*; growing every where; may be weakened by good tillage and weeding, but not totally destroyed otherwise, than by universal agreement to root it up, before its seeds ripen, or by a regulation of police enforcing the same; this weed one should almost conclude to be naturally produced by the soil, in consequence of the curse, "thorns also and thistles, shall it bring forth unto thee;" yet doubtless strictly speaking, produced only from its numerous fibrous roots, (which are hardy and strictly perennial, and which if separated in parts by ploughing, or digging, each part will, if left fresh in the soil, often vegetate, and produce a plant;) and from its more numerous seeds, which are feathered, and will fly to a great distance with the wind, and when it becomes calm alighting upon cultivated land, they will there vegetate and grow luxuriantly, so that it is in vain for any person to attempt, clearing his land of this weed, unless his neighbours also pursue the same plan: the roots of this plant may be pretty effectually destroyed, by a well managed summer fallow; as they will not survive repeated ploughings up in hot weather; and if due attention were bestowed to prevent it seeding, its numbers might be diminished: it is very injurious to all crops.

The goat and ass will eat it: horses, will sometimes crop the heads when young and tender, but no other cattle touch it growing. When burnt, it is said to yield a very pure vegetable alkali. *Flora Rustica.*

46. Thistles *(Carduus's)*, called in Staffordshire, boar thistles, to distinguish them from the last, and from sow thistles, several sorts, principally the *Carduus lanceolatus*, *pratensis*, and *acaulis*; with other sorts less common; they abound in meadows, pastures, hedge sides, and borders of corn fields, where they should be rooted up after rain, before their seeds ripen, otherwise such seeds are liable to fly all over the country; these plants grow very luxuriantly, drawing much from the soil, and injuring or preventing the growth of grass near them, are very unsightly, and useless to cattle; some of the species, particularly the meadow thistles, are perennial, others are annual or biennial. Dr. Withering has mentioned the following uses of thistles, he says of the *Carduus lanceolatus*. If a heap of clay is thrown up, nothing would grow upon it for several years, did not the seeds of this plant,

wafted by the wind, fix and vegetate thereon; under the shelter of these other vegetables appear, and the whole soon becomes fertile; and the heads of most of the species, he observes, may be boiled and eaten as artichokes.

47. Coltsfoot *(Tussilago farfara)*, very apt to abound in hard tilled land. Lord Hawke informed me, at the Board of Agriculture, "that the only time to destroy this weed, is by cutting it up in those months when it begins to throw out its flower, at which time, if so cut, it will bleed to death;" these months are February and March, at which time all land in fallow, subject to this weed, should certainly be ploughed, and harrowed down, which would doubtless check the growth of, and very much weaken, the plant; neglected at this time, it will soon after ripen its seed, which furnished by nature with feathers, flies all over the country, and establishes itself very quickly on cultivated land, and banks of earth newly thrown up. This weed may be considerably weakened by repeated summer ploughings, and may afterwards, for the greatest part, be weeded out by hand, as the ground is thus rendered light.

48. Groundsel *(Senecio vulgaris)*, often found in fallows, on good soil rendered fine by cultivation, as its seeds ripen rapidly, and fly over the country with the wind: the plant should be destroyed in time, by weeding out, or ploughing under, and the seed by no means permitted to ripen.

49. Corn marigold, goulans, goul, buddle in Norfolk *(Chrysanthemum segetum)*, an extremely troublesome weed in some soils; an annual plant, producing seed plentifully, which vegetate whenever the soil is cultivated, and very commonly in crops; would doubtless be destroyed, like other annual seedlings, by early and complete fallowing, to bring the seeds in due time into vegetation, and afterwards ploughing the plant under; in Denmark there is a law to oblige the farmers to root it up. Withering. It is stated in the Statistical Account of Scotland, Vol. II. p. 4, that the late Sir William Grerson, of Lag, held *goul (Chrysanthemum)* courts as long as he lived, for the purpose of fining such farmers on whose growing crop three heads, or upwards, of this weed were found; and it is observed by the President of the Board of Agriculture, that "some regulation of police for fining those who harbour weeds, the seeds of which may be blown into their neighbours' grounds, has no injustice in the principle." If this plant be cut when young in flower, and dried, horses will eat it. *Flora Rustica.*

50. Stinking May weed *(Anthemis cotula)*, common in corn fields, though often

confounded with the corn chamomile *(Anthemis arvensis*, and *Matricaria chamomilla)*, from which it is to be distinguished by its disagreeable smell; they are all injurious to corn crops, and should be prevented or destroyed by good fallowing, or by weeding out.

51. Blue bottle *(Centaurea cyanus)*, an annual weed, with a somewhat elegant blue flower; common in corn, where the tillage has been imperfect, or too long carried on without cleaning, by turnips or fallow.

52. Great knapweed *(Centaurea scabiosa)*, a perennial corn weed, growing in tufts of many stems from the same root; should be destroyed in fallow, or by weeding out of the crop.

53. Pansy *(Viola tricolor)*, an annual flower, often found amongst corn, where it is produced by seeds not destroyed in the preparation for the crop: the beauty of the flowers has gained them a place in gardens.

54. Corn horse-tail *(Equisetum arvensis)*, often found in corn land, the fertile stem appearing early in the spring, with that of coltsfoot, and decaying before the other part of the plant appears. Loesel says, if ewes in lamb eat it, abortion is the consequence; but it is believed sheep or cows will not eat it, unless compelled by hunger. It must be destroyed by the same tillage and weeding recommended for coltsfoot.

55. Fern *(Pteris aquilina)*, not uncommon in corn fields on dry sandy land; a hardy perennial, tenacious of growth, and striking a long tap root into the ground, beneath the reach of the plough, which shoots up vigorously when the sun becomes powerful; the plant should be drawn up after soaking rain, but it will sometimes require a good deal of pains and attention to destroy this plant, particularly on land where it has been long established.

These are the principal weeds which the writer hereof is acquainted with, as infesting our corn fields; and in addition to what has been said before on their extirpation, the following is added here, in which, if there should be any repetition of former expressions, he hopes it will be excused, as the necessity of banishing them from cultivated land can scarcely be too strongly inculcated, or too often repeated.

On destroying Weeds on Corn Lands.

Dr. Anderson observes, that "there is only one mode of extirpating annual weeds, whose seeds are indestructable; that is, to put the ground into such a state

as to induce them to germinate, and then to destroy the plants" by harrowing up or ploughing under. This is strictly true, but I do not exactly agree with him in the process; the ground, for this purpose, should be ploughed before winter, but not harrowed, it being better to lay rough through that season, so as to have the greatest extent of surface possible exposed to the mellowing of frosts; as soon as it becomes dry in March, it should be cross-ploughed and harrowed down; many of the seeds and roots will then vegetate, which should in due time be ploughed under and harrowed again, and this process repeated as often as necessary: this is the true use of summer fallow, which, to have its proper effect, should always be attended to early in the season, when the powers of vegetation are greatest, and the heat of the sun is powerful.

The great defect in the management of summer fallows, seems to be the neglect of working them early in the season, by which omission, the vigorous annual seedling weeds are not brought into vegetation in due time, after which they will not grow till the spring following, when they appear in such abundance amongst the wheat as sometimes to choke the crop; this is the reason why the poppy, the corn crowfoot, the tare, and many other annual weeds, make such havoc amongst wheat, when by a judicious early working the fallow, they might have been brought to exhaust themselves in the fallow summer: this appears very clear from the effect, for if no wheat were sown, the seeds of these plants would often fill the ground with a full crop; but seeds can vegetate but once, consequently, had this vegetation been brought on in the fallow, and the plants afterwards been ploughed under in due time, none could have appeared in the wheat crop.

The turnip culture is peculiarly adapted to the destruction of weeds, as for this crop the ground must of necessity be in early preparation, by which weeds of early growth are brought into vegetation and destroyed, and those which remain alive in the soil may be exterminated by hoeing. I have observed that wet weather is as necessary as dry to give a summer fallow its whole effect; for without a soaking of rain after the land is pretty well pulverized, numbers of the seeds will not vegetate, but remain and grow amongst the crop; the root weeds are therefore to be destroyed in dry weather, and the seedlings after rain; and though the land should after a dry season be apparently in excellent order for sowing, it is better to wait the effect of rain, and even give time for seedlings to vegetate before you actually sow for the crop.

Some years ago, in a dry season, I remember a ten-acre piece prepared for turnips, and apparently in excellent order for sowing; the one half of it was sown without waiting for rain, and the other half left; plentiful rain soon came, and on the sown part the turnips and chadlock started together, and the crop was very full of the latter, which required great trouble to clean out by hoeing and hand weeding: about a fortnight after the other part was again ploughed, and then sown with turnips; on this part scarce a single plant of chadlock appeared, the seed having vegetated in consequence of the rain, was destroyed by the after-tillage.

The summer of 1795 was very dry and free from soaking rain in this neighbourhood; in that summer I had a wheat fallow of nine acres manured with lime; harvest being finished, and it appearing in excellent order for sowing early in September, it was sown with wheat accordingly; soon after plentiful rain came on. By some accident one butt or land, about four yards wide, the whole length of the piece, was left unsown, having been harrowed without sowing: the wheat appearing in due time elsewhere, the omission was discovered; it was now sown and ploughed in. The other part of the field abounded with chadlock, on this butt there was scarcely a single plant.

The early sown wheat fallows of the summer of 1795 were very generally full of chadlock; whilst the later sown were not at all, or much less, infested with that plant: the reason is very clear from what has been said above.

Hence it appears that the destruction of root weeds and seedlings, on corn land, must be effected upon different principles; the former by working them out of the soil in dry weather only, the latter by pulverizing the soil, so as to induce the seed to germinate after rain, and afterwards ploughing under the young plants; also that frequent ploughings and harrowings are necessary, to expose all the seedlings contained in the soil to the powers of vegetation.

The ploughings and harrowings of fallow ground should not, however, immediately succeed each other; time should be given for the consolidation of the soil, which, after well harrowing, will undergo a slight fermentation, and settle, as it were, into a mass, after which it will turn up mellow, and the destruction of weeds will go on apace. The frequent ploughings, that have been recommended by some, are not only unnecessary but injurious, insomuch that if any person would plough your fallow weekly for nothing, I believe it would be wrong to accept it. I have always observed that one ploughing of a fallow too soon succeeding another has no

other effect than that of rooting about the clods, and prevents the general effect of consolidation and fermentation. The suffering of weeds to spread their leaves a little between the several ploughings of a fallow is not injurious; care, however, must be taken not to carry this idea too far, particularly in the case of squitch grasses, or so as to suffer any of the quick growing weeds to ripen their seed, or the luxuriant ones to become too large for burying with the plough.

If a fallow for turnips be cross ploughed and harrowed down in March, it will generally lie very well to the beginning of May; and in general no fallow will want ploughing oftener than once in six weeks, if sufficient harrowings be given between the ploughings; the particular time most proper for these operations must, however, be determined not by any general rule, but by local circumstances, experience and observation.

The list here given of arable weeds may perhaps appear long, and the evils attending them, as well as the pains and labour necessary in their extirpation, may appear formidable to those who have not experienced or considered the subject: there is, however, no exaggeration in the account, and in the case of unimproved or ill managed land the statement here made will apply in its whole extent; where lands are already improved, and have been for some length of time under good systematic management, the business is in part performed, and the evil much lessened; in such land, and in all other, every rotation and course of cropping ought to render the land cleaner and freer from weeds, which it will certainly do in a judicious system with due attention: the means to be used are generally, 1. Complete and well managed fallows, when fallows are necessary or proper: 2. Manures free from the seeds or quick roots of weeds: 3. A careful choice of clean seed: 4. Short tillages, i. e. not taking too many crops in rotation: 5. Attentive weeding and a spirited use of the hoe, in which view the drill husbandry doubtless affords superior advantages to broad-cast, in keeping land clean from weeds; but land must be well cleaned before the drill husbandry is applicable: 6. A plentiful use of the clean seeds of the best grasses and trefoils at the end of the tillage: 7. Weeding the land when at grass, so as not to suffer the seeds of any injurious plants to spread themselves: 8. Upon again breaking up the land to pursue such a system of cropping as will not increase or encourage weeds.

Upon these subjects much might be said, but I think it unnecessary, as the intelligent farmer will eaily supply himself with every precaution necessary from his own

observations; I shall therefore only slightly touch upon the several particulars: upon fallows some observations are made above; respecting fold-yard manure, it should always undergo a fermentation before laying on the land, sufficient to prevent the future vegetation of any seeds that may be contained therein; but it should also be kept as free as possible from the seeds of weeds, and perhaps it is best laid on grass land, applying only lime, or other manures certain of being clean, to fallows; or if dung not certainly clean from seeds be laid on fallows, it should be laid on early enough to give time to the seeds to vegetate and spend themselves before sowing for the crop. Every one knows the necessity of clean seed to producing a clean crop, but sometimes neglect to apply such knowledge, and indeed clean seed is not always to be procured. Short tillages are universally approved in theory, but sometimes the idea of present advantage tempts a deviation in practice. Weeding of crops is generally imperfectly performed, and likely to continue so in many places, from the difficulty of procuring hands enough for work only temporary; thistles are generally only cut off, but they should always be drawn up by tongs, and other weeds by hand: the hoe has yet been only of general use in turnips, nor is it likely to extend farther, unless the drill husbandry should be more established, nor even in its present application can hands enough be always procured at reasonable rates. In the laying down of land to grass, the importance of clean seed is well understood, yet the seeds of docks are often sown with clover, and those of other pernicious plants with ray-grass: in the weeding of grass land, docks and thistles are often mown, or only cut off, but they should always be rooted up; for which purpose docking irons are formed upon a construction proper enough; they are, I suppose, every where understood, consisting of a forked or clefted spike of iron, jagged within the cleft, and fixed to the end of a wooden lever; this being forced down by the hand or foot, so as to inclose the root of a dock, or large thistle, will easily bring it up, particularly after rain; but mowing them off, being done with more expedition, is often practised, and they are sometimes left undisturbed, and suffered to scatter their seeds without any effort being made to prevent it.

Upon breaking up a turf, it is understood here, that unless a wheat fallow or a turnip crop compose a part of the tillage, the land will be injured and rendered fouler, and more addicted to produce weeds; this notion is, I believe, a just one, though often deviated from in practice for the sake of present profit, and under the idea of cleaning the land again next tillage; it is, however, well ascertained, that

land well cleaned by former good management will best bear this deviation, for the fewer weeds it contains at breaking up, the less will be the increase of weeds during the tillage.

There is another cause of the increase and propagation of weeds, which may be termed a public cause, which it is not in the power of any individual to prevent; which a slovenly, neglectful, or ill-disposed individual may promote and increase, and which can only be prevented by a political regulation, and for which, I believe, no provision has yet been made in our political code; this is the numbers of vigorous and luxuriant weeds which are suffered to ripen their seeds in our hedges, pastures, woods, and other lands, and whose seeds being furnished with feathers, fly over the whole country, and propagate themselves far and near, growing wherever they alight and settle, and producing a plentiful crop; the most common and pernicious of which are the following:

1. Sowthistles *(Sonchus's)*, several sorts.
2. Saw-worts *(Serratula's)*, sorts.
3. Thistles *(Carduus's)*, sorts.
4. Coltsfoot *(Tussilago farfara)*.
5. Groundsels *(Senecio's)*, sorts.
6. Knap weeds *(Centaurea's)*, sorts.

As the seeding and scattering the seeds of these plants is clearly a public nuisance, as they are liable to be carried to a great distance by currents of air, and to injure the lands of all persons indiscriminately, I think they ought to be within the reach of our political regulations. It is very justly observed by the President of the Board, "that some regulation of police for fining those who harbour weeds, the seeds of which might be blown into their neighbours' ground, has no injustice in the principle." Dr. Withering observes, that in Denmark there is a law to oblige the farmers to root up from their corn-fields the corn marigold *(Chrysanthemum segetum)*; but this plant is not so publicly injurious as those above specified, the seeds having no feather, are much less liable to be blown elsewhere. It might, perhaps, be worth while to enquire the nature of this law in Denmark, though probably the despotism of the laws of that country might be unsuitable to our freer constitution; the following regulation is what strikes me in the first instance as practicable, and which may, probably, be better modelled upon farther consideration.

Suppose then the petty constable were required, by precept from the high constable,

to give, in their presentments to the quarter sessions, a list of all persons who suffered the above plants to run to seeds in their hedges or lands, such presentments to be particularly specified to the court; those referring to the coltsfoot to be given in at the Lady-day sessions; and those referring to thistles of all kinds, sowthistles, groundsel, including ragwort and other *Senecio's,* and knapweeds, to be given in at the Midsummer sessions; an order of court might be made for the removal of such nuisances within one month, and a view appointed at the expiration of that time by two of the neighbouring justices, who should be empowered to fine the offenders not complying with such order, in any sum not exceeding five pounds, to be applied to the relief of the poor of the parish where such offence existed. If the present laws respecting nuisances do not give sufficient power for the above to the magistrates, I think a special act for that purpose is not beneath the notice of our Legislature.

The above proposed regulations generally adopted and applied in practice, it is presumed, may render the British empire as free from noxious weeds as those of China and Japan; particularly if united with the several precautions before proposed for preventing or exterminating these intruders: and it is hoped this public notice of an evil from a public body may tend to draw the attention of farmers and land occupiers more decidedly to this subject, as it is much more desirable to excite a voluntary spirit of national industry, than to enforce it by coercive measures, though I believe in the instance here alluded to little coercion would be necessary; as the extirpation of the weeds here specified would be unanimously agreed upon whenever the subject came under the cognizance of the public eye, and the interference of the police, by publicly exposing such as neglected their duty in this particular might probably be productive of a good effect.

III. *Weeds in Grass Land.*

As it is not exactly agreed, even by attentive observers, what may be deemed useful plants, and what injurious ones, in the herbage of our meadows and pastures, the writer hereof has first given a list of what he believes noxious plants in grass land; and has afterwards added a list of what he calls neutral plants, with a few observations on them, in hopes of inducing a fuller investigation of this subject; in which it may perhaps be found, that some of this last class are useful herbage, and others noxious, though their particular qualities are not yet fully discovered. The

plants here particularized are such as the writer has observed himself, or the authorities are given.

1. Cotton grass, hares-tail, moss crops; *(Eriophorum vaginatum* and *polystachion)*, growing in bogs or meadows; poor people stuff their pillows with the down, and make wicks of candles with it. This plant is a certain token that drainage has been neglected.

2. Hog weed, low parsnip *(Heracleum angustifolium)*, often found in meadows, but too coarse and weed like to be suffered to abound on well managed land, though I believe cattle will eat it either green or in hay: may probably be weakened or destroyed, by annually cutting up.

3. Wild cicely, cow weed *(Chærophyllum sylvestre)*, common in orchards, hedges, meadows, and pastures: cattle are fond of it in the spring, but I think it too coarse to be encouraged amongst grass. This plant and the last may probably be worthy of trial in cultivation by themselves, being of luxuriant growth, would yield a large produce, but their value has not yet been fully ascertained.

4. Ramson *(Allium ursinum)*, in some meadows, but commonly in hedges; other plants will not flourish near it; cows eat it, but it gives their milk and its produce a garlic flavour, and should therefore be weeded out.

5. Rushes of sorts *(Juncus's)*, often found in meadows, and pastures, and are a sure indication that the land wants draining; which when effected, they always give way to better herbage, though their extirpation after draining will be accelerated by top dressings of ashes.

6. Docks *(Rumex crispus, acutus, obtusifolius, &c.)* should be rooted up after rain, from meadows and pasture land, being refused by cattle; and eaten only by fallow-deer, who prevent their flourishing in parks.

7. Bistort *(Polygonum bistorta)*, in some places occupying large patches in meadows, to the injury of better herbage; it is a perennial plant, but might doubtless be weakened by repeatedly rooting up; the root is one of the strongest vegetable astringents. Withering.

8. Wild campion *(Lychnis dioica)*, often found abundantly in arable pastures, where care should be taken to exterminate them, by well fallowing the land; there are two sorts, with white and red flowers.

9. Goose tansy, silverweed, or feathered cinquefoil *(Potentilla anserina)*,

common in many arable pastures, but generally untouched by cattle, should therefore be destroyed in the tillage, and by keeping the land free of stagnant water

10. Pilewort *(Ficaria verna).* Withering. *(Ranunculus ficaria). Flora Rustica.* Flowers very early in the spring, and abounds in shady, or moist ground; it occupies much room in some meadows, and chokes other plants, which grow near it, and not being eaten by cattle, should certainly be extirpated; nothing discourages its increase more than coal or wood ashes. *Flora Rustica.*

11. Lousewort, red-rattle *(Pedicularis sylvatica)*, in moist meadows, and pastures, and, I believe, rarely found but where the land is in want of draining; said to be very disagreeable to cattle, and injurious to sheep; but I believe the injury is principally occasioned by the unwholsome nature of the land, on which it grows: may be destroyed by draining and top dressing.

12. Dyer's broom *(Genista tinctoria,)* I have seen it very abundant in some pastures, on strong or moist land, from whence it ought to be grubbed up.

13. Rest harrow, cammock, *(Ononis spinosa*, and *arvensis)*, often found in pastures, where it is eaten by cattle, particularly the younger shoots: but is too coarse and rubbishy to be suffered to increase, and should therefore be rooted out, or grubbed up.

14. Common or way thistle, *(Serratula arvensis)*, should be cut off within the ground, or rooted up.

15. Rough, or large thistles, boar thistles, *(Carduus's)*, are generally mown or otherwise cut off, but are much better rooted up.

16. Cudweed, chafeweed, *(Gnaphalium germanicum)*, not uncommon in arable pastures. I have seen it abundantly in an upland pasture, after barley, where the clover has failed of success; cattle refuse it, but it is said to be successful in the bloody flux of cattle, and of the human species; it seldom appears much in a crop, or when the artificial grasses well succeed.

17. Ox-eye, white marigold *(Chrysanthemum leucanthemum)*, common in some pastures; and not grateful to cattle; but seldom abounding so as to be much injurious, and easily drawn out by hand.

18. Black knapweed *(Centaurea nigra)*, very common and abundant in some moist meadows, and pastures; where it is a bad weed, being a harsh stubborn plant, seldom touched by cattle either green or dry, and not extirpated without

much difficulty; it is a perennial plant, and increases much by the root *(Flora Rustica)*. It might however, very probably be much weakened, and by degrees extirpated, by drawing up after rain. "Goldfinches are fond of the seeds." Withering.

19. Sedge grasses, various sorts *(Carex's)*, provincially hard grass, iron grass, carnation grass, most common in old sour moist land, undrained and unimproved; where in some places it occupies the whole surface; extremely hardy, and flourishing where scarcely any thing else will grow; seems produced by nature from this principle in her economy, that a bad plant is better than none, for this plant is not eaten by cattle who can get any thing better; yet, upon draining and top-dressing the land, it will generally give way to a finer and more valuable herbage.

20. Nettle *(Urtica dioica)*; sometimes growing in tufts on pasture land, where it should be rooted up, as it will prevent the growth of better herbage; asses are said to be fond of it, and cows eat it in hay.

21. Mosses *(Musci)*, various sorts; sometimes spreading on pasture land, and I believe indicating that the herbage is starving and torpid, and wants a stimulus to quicken its growth: top-dressing should be used, and draining, if necessary; and if the land be arable, a pulverization by tillage with liming, and the seeds of fresh herbage, after a crop or two, may be applied.

The above I consider as plants to be extirpated from meadow and pasture land; besides which there are many others of less import, whose characters are doubtful, or uses not ascertained, and to which little attention is commonly paid but what they command from the beauty and variety of their flowers; the most common of which, that have come under the observation of the writer hereof, are as follows:

1. Speedwell *(Veronica's)*, two or three sorts; little attention is paid to them by farmers; they are common in pastures, and I believe eaten by cattle.

2. Valerian *(Valeriana officinalis)*, common in moist land.

3. Spurwort *(Sherardia arvensis)*, in arable pastures after tillage.

4. Ladies mantle *(Alchemilla vulgaris)*, not uncommon in meadows.

5. Primrose, cowslip, &c. *(Primula's)*, considered as of no consequence, to the hay or herbage.

6. Centory *(Chironia centaureum)*, extremely bitter; a diminutive plant with a pale red flower, common in pastures.

7. Pignut (*Bunium flexuosum*), common in old pastures, but not supposed of any consequence.

8. Purging flax (*Linum catharticum*), common in pastures, but little attended to.

9. Harebell, English hyacinth (*Hyacinthus non scriptus*), very abundant in some meadows, which I believe are not supposed better, or worse, on that account.

10. Daffodill (*Narcissus pseudo Narcissus*), very numerous in some meadows, particularly near villages, or houses, and much admired for beauty, and early appearance, but not otherwise attended to.

11. Fritillary (*Fritillaria meleagris*); this very curious and rare flower adorns in great profusion, some meadows in the parish of Wheatenaston, Staffordshire. (Rev. Mr. Dickenson.)

12. Meadow sorrel (*Rumex acetosa*), common in meadows, and, I believe, not at all injurious, but probably good herbage.

13. White saxifrage (*Saxifraga granulata*), in meadows in the moor lands of Staffordshire.

14. Cuckoo flower (*Lychnis flos cuculi*), common in meadow, but not attended to.

15. Meadow sweet (*Spircea ulmaria*), coarse, but not disesteemed by some; cows and horses are said to refuse it, but probably eat it in hay; the farina or dust of the ripe blossoms is said to be an excellent styptic.

16. Cinquefoils (*Potentillas verna*, and *reptans*), common in pastures, and, I believe, eaten by cattle, but of little account as a pasture plant.

17. Tormentill (*Tormentilla reptans*), similar to the last; growing in cold moist meadows.

18. Dwarf sun flower (*Cistus helianthemum*), found in mountainous pastures, of much the same value with the two last.

19. Wood or meadow anemone (*Anemone nemorosa*), common in meadows, but disregarded by farmers; the whole plant is acrid: when sheep that are unaccustomed to it eat it, it brings on a bloody flux. Withering.

20. Meadow rue (*Thalictrum flavum*), abounds in patches in a meadow on my farm, where it is mown with the grass for hay, without any attention being paid to it, and without any known effect.

21. Crowfoots, butter flower, butter cup, gold cup (*Ranunculus bulbosus*, *repens*, and *acris*), common in meadows and pastures in every part of the island that

I am acquainted with, so much so, as to give a yellow tinge to the whole surface in the month of June; very abundant in the hay grounds near London, and indeed every where else: these plants are so prevalent in our meadows and pastures, and their good qualities have been so often questioned, that it seems highly proper their effects should be precisely ascertained. It is said in Withering's Botany, of the *bulbosus*, "cows and horses have a great aversion to it; and of the *acris*, "cows and horses leave this plant untouched, though their pasture be never so bare; it is very acrid, and easily blisters the skin." The *Flora Rustica* has given very elegant figures of these three plants, with remarks on the *bulbosus*, that "it inflames and blisters the skin, and beggars are said to use it for that purpose, to excite compassion by artificial sores; and on the *acris*, that "if cattle chance to eat it, their mouths become sore and blistered:" the three species are all occasionally found wild, with double flowers; in this state we frequently see the first and third cultivated in our flower gardens, especially the third; but we should derive more satisfaction from informing the farmer how he might effectually root them out of his pastures than how he might cultivate them successfuly in his garden, for they propagate themselves with great facility, and occupy a considerable space in good meadows. *Flora Rustica.*

Notwithstanding these authorities, I am inclined to think more favourably of these plants. I have never known a practical farmer name them as in the least degree injurious; and it is very certain of the *Ranunculus repens*, that cattle eat the foliage greedily with other herbage; and if they refuse the other species in bare pastures, it is probably because they have been deprived of most of their foliage with the adjoining herbage, and the remaining part of the plant is too acrid to be eaten alone; and indeed cattle refuse the flowering stems even of grasses, when deprived of their leaves: these plants may therefore be considered as seasoners and correctors, and adapted to uses in the animal economy, similar to that of salt, mustard, pepper, and vinegar at our tables, to correct the flatulent or putrid qualities of the more palatable and luxuriant dishes on the great table of nature; and though not eaten alone, are an agreeable and useful stimulant with other more simple food. If these plants have any injurious qualities they have hitherto escaped the notice of farmers, all of whom cannot reasonably be supposed devoid of due attention.

22. Meadow bout (*Caltha palustris*). This plant, though I believe useless to cattle, and occupying a good deal of room in some meadows, is of welcome

appearance, its early showy flowers announcing the approaching spring; it declines time enough to give room for the growth of the later luxuriant grasses.

23. Bugle (*Ajuga reptans*); common in some places on moist land.

24. Wild mint (*Mentha arvensis*); in moist pastures; it prevents the coagulation of milk, and when cows have eaten it, as they will do largely at the end of summer when the pastures are bare, their milk can hardly be made to yield cheese; a circumstance which sometimes puzzles the dairy-maids. This plant may be weakened by effectually draining the land.

25. Self-heal (*Prunella vulgaris*); common in pastures; cows and sheep eat it, horses refuse it. Withering. It is little attended to.

26. Eyebright (*Euphrasia officinalis* and *odontites*); common in pastures, and I think generally refused by cattle.

27. Lady's smock (*Cardamine pratensis*). The leaves probably wholesome food green, and good in hay.

28. Crane's-bill (*Geraniums*), several sorts; very common in upland pastures; but little known or regarded.

29. Milkwort (*Polygala vulgaris*). I have found it often on uncultivated land, but have not seen it in meadows or improved pastures: cows, goats, and sheep eat it. Withering.

30. Goat's-beard (*Tragopogon pratense*); often to be found in meadows and pastures.

31. Dandelion (*Leontodon taraxacum*); very common, considerably diuretic; has probably a good effect on cattle from that quality at first going to grass; this and the last have similar qualities, and are good in hay with grasses.

32. Daisy (*Bellis perennis*); growing almost every where; no attention is paid to it, but what it claims from the beauty of its flowers.

33. Yarrow (*Achillea millefolium*) and sneezewort (*Achillea ptarmica*), both common and indiffetent to cattle, the former is recommended for cultivation on poor land, by Anderson.

34. *Orchis's*, several sorts, common in meadows, having generally broad, entire, spotted leaves, and beautiful pale-coloured, or purple flowers in spikes, flowering through the early part of the summer; no attention is paid to them, as either useful or injurious, though I believe they are generally untouched by most, or all sorts of cattle.

Many of these plants deserve farther examination respecting their utility for cattle, or the contrary; green or in hay, as being hardy natives, their increase may be encouraged; or if injurious, means should be used towards their extirpation, or at least to weaken them, and reduce their numbers.

IV. *Weeds in Waste Lands.*

The weeds growing in waste land, considered as particularly injurious to such land, are not very numerous; for though many species of plants, useless for the food of domestic animals, grow there, yet, as there is no chance of introducing any thing better till such lands are appropriated and improved by cultivation, they can hardly be considered as noxious, so long as nothing better can be introduced in their stead.

As waste lands in their present state are useful only as sheep-walk, or for producing fuel, the improvement of them as sheep-walk is an object deserving attention, particularly as such improvement would render them of greater value in case of inclosure, and would much shorten the business of bringing them into cultivation.

The weeds that encumber waste lands, and reduce their value as sheep-walk, are of two kinds; the common upland rubbish, and the bog weeds; the former smothers the land, so as to prevent the growth of better herbage, and the latter are generally injurious to animals that feed on them, either from their own nature, or because the land on which they grow is uncomfortable for, and unwholesome to, the health of animals, especially to sheep.

The upland rubbish is principally, 1. Heath *(Erica's)*, of sorts. 2. Furze or gorse *(Ulex europæus)*. 3. Petty whin, or hen gorse *(Genista anglica)*. 4. Broom *(Spartium scoparium)*, but more commonly found in neglected dry arable land; these, where the land is of tolerable staple, should be burnt off, or grubbed up early in the spring; and if the land was afterwards sown with hay seeds in moist weather, it might much mend the herbage; also, 5. Fern *(Pteris aquilina)*, should be mown and carried off in summer, the value of it as litter being well worth the labour.

The bog weeds, or those occasioned by stagnant water, are principally, 1. Cotton grass *(Eriophorum polystachion*, and *vaginatum)*. 2. Matt grass *(Nardus stricta)*. 3. Rushes *(Juncus's)*, several sorts. 4. Red rattle or louse wort *(Pedicularis*

sylvatica). 5. Marsh St. Peter's wort *(Hypericum elodes).* 6. Kingspear *(Narthecium ossifragum):* these two last are of little consequence in themselves, but indicate boggy land; in their company is often found, 7. Purple flowered money-wort *(Anagallis tenella).* 8. Sedge grasses *(Carex's),* several sorts: these plant would give way to better herbage, upon draining their native bogs, which ought to be done by a rate, levied upon the inhabitants of the neighbourhood, having right of common.

If the country be not yet ripe for inclosing all the commons and waste lands, the improvement of their staple by measures of this kind, by destroying weeds and introducing better herbage; by draining the bogs and destroying the aquatic weeds growing therein, would mend their present state, and improve their value to the public; would render them capable of maintaining a greater number of sheep, and preserve such stock in better health, as well as render the land more susceptible of a rapid and easy improvement by cultivation, whenever the time shall arrive for their inclosure, and for such improvement.

V. *Weeds in Hedges.*

All kinds of weeds are injurious to young hedges, which require to be well cleaned from them for three years after planting, otherwise the young quick would be choked and destroyed; and there are some kinds of plants which very much injure old full grown fences. Many kinds of weeds growing in hedges are a great nuisance if the seeds are suffered to ripen, because such seeds are liable to be carried into cultivated land by the wind; there are also some kinds of hedge weeds, which bear the character of being injurious to stock; these, if the observation be well founded, should be cleared from the hedges that such stock frequent; and, lastly, improper species of the vegetable kingdom, composing or growing in hedges, may be termed hedge weeds, because they prevent the main object of such hedges, that of dividing and fencing out the land.

1. The catchweed, or cleavers *(Galium aparine),* has a tendency to choke young hedges, by means of its numerous creeping rough branches; it should, therefore, be cleaned out in due time.

2. The great bindweed *(Convolvulus sepium),* is, I think, injurius to some hedges, by twining round the growing quick; the roots of this plant must be well worth gathering for medical uses, the inspissated juice of them composing scammony, a

powerful drastic purge. Dr. Withering observes, " Can it then be worth while to import scammony from Aleppo, at a considerable annual expence, when a medicine, with the very same properties, grows spontaneously in our hedges? though an acrid purgative to the human race, it is eaten by hogs in large quantities, without any detriment."

3. The great wild climber *(Clematis vitalba)*, common in hedges in the chalk counties, called there provincially old man's beard, from the hoary appearance of the plant after flowering, the seeds being furnished with numerous grey hoary tails. This plant is very injurious to fences, for the leafstalks twine about any thing they can lay hold of, and thus support the plant, which is large, luxuriant, and heavy, without any strength to support itself, and by its weight hauling down and deforming the fences. " The fine hairs which give the cottony appearance are, I apprehend, too short to be employed in manufacture, though it is probable they may be used to advantage for the stuffing of chairs." Withering.

The hop *(Humulus lupulus)*, the ladies seal, or black bryony *(Tamus communis)*, and the wild vine or bryony *(Bryonia dioica)*, are all common in hedges, where I think them somewhat injurious to the fences.

Sow thistles, the large rough thistles, knapweeds, and ragwort, as named before, are a great nuisance, if their seeds be suffered to ripen in hedges: in addition to which may be added the following, whose seeds are also furnished with feathers, and capable of flying to a great distance, and which are also often to be found in hedges:

Yellow devil's bit *(Leontodon autumnale)*.

Wild lettuce *(Lactuca virosa)*.

Yellow hawkweed *(Hieracium murorum)*.

Bushy hawkweed *(Hieracium umbellatum)*.

Smooth hawksbeard *(Crepis tectorum)*.

Burdock *(Aretium lappa)*, a well known plant, which should not be suffered to perfect its seed in hedges, being very luxuriant of growth. " Before the flowers appear, the stems, stripped of their rind, may be boiled and eat like asparagus; and when raw, they are good with oil and vinegar." Withering.

These, and other plants of a similar nature, as well as all luxuriant weeds, and shoots of brambles, and whatever else grows beyond the bounds of the fence,

ought to be brushed out of hedges about Midsummer, as is very often done in Staffordshire for the sake of their ashes, which are worth all the labour.

The dogs' mercury (*Mercurialis perennis*), is said to be noxious to sheep; it is very common and abundant in some hedges, and appears very early in the spring, when sheep food is very scarce; on which account it is still more dangerous, if it be so at all.

Most kinds of smooth wood make but an inferior fence, and therefore, upon plashing down a hedge, they are to be rejected and cut out, wherever there is enough of the hawthorn, crab, or blackthorn to supply their place; but the hawthorn is much to be preferred: the blackthorn (*Prunus spinosa*), makes a good impervious fence, but is apt to grow out of bounds, from its roots spreading and sending out shoots; the shrubs of the rose kind (*Rosa's*), are objectionable on the same account, as well as because their branches grow irregular also; and the bramble is still more objectionable on these accounts: even the hazle (*Corylus avellana*), may be termed a hedge weed in some populous neighbourhoods, because it tempts trespassers to break the fences in seeking for the nuts. Timber trees should be planted sparingly, or with a proper selection, in hedges, for they certainly much injure the fences, which never grow so vigorously under the shade of trees as elsewhere; the elm is the least objectionable on this account, from its lofty growth; the ash may certainly be termed a hedge weed on many accounts, though so valuable in its proper place, which should be in clumps, coppices, or plantations; the alder is often planted in hedges on low land, where it is of quick growth, but should always be rejected on upland; where, indeed, for fence, every thing must yield to the hawthorn, whose superiority is established, and well known.

VI. *Weeds in Woods and Plantations.*

The cultivation of timber may be considered as a branch of Agriculture, and as that part of it peculiarly the province of the gentlemen, and owner of the soil, since the length of time required to bring the crop to perfection, must necessarily preclude all others; and little expectation can reasonably be formed of personal profit; yet it often happens, that the individual amusing himself with this employment, has at the same time the pleasure of reaping the crop, raised by the labour

of his ancestors; and, may have the satisfaction of reflecting that he, in his turn, is preparing the same pleasure for posterity.

As the cultivation of timber is generally undertaken as a matter of pleasure and amusement, it must heighten that pleasure, to unite with it the greatest utility and future profit; which is to be done by a preference of the most valuable species, and by less attention to those of inferior consequence.

The oak is the true staple of our woods, and of by far the first consequence on many accounts, in comparison of which, many other sorts may be termed mere weeds of the forest; even its bark is a leading article in one of our most staple manufactures, the wood is necessary for the defence of our country, and applicable to numberless domestic uses: this can never want price, so long as any article brings it. The ash, and the elm too have their manifold uses; and whenever firs and evergreens are planted, if the soil be suitable to English forest trees, they should be at such distances, as that the oak, and the ash, may be introduced between them, and as the latter grow and require more room, some of the former should be cut away.

I consider large plantations of Scotch, and other firs, on land proper for our best English forest trees, as mere weeds in comparison of what might have been raised on the same ground; and have sometimes looked upon the large forests of beech, in some of the counties near London, in but little better light; particularly when I have by chance met with a very fine oak, here and there, in the proportion perhaps, of one to an hundred beech trees; when had the major part of the trees been oaks, the value of the whole would have been many times doubled.

I therefore cannot but consider the inferior kinds of wood, as coppice weeds, when they occupy the ground that might and should have been planted with the more valuable kinds; but as every kind has its value and use, if it be but for fuel, the planter upon a large scale will of course cultivate a variety of kinds, but his attention should be principally directed to those of superior quality, which should certainly have the preference in point of numbers.

As no live stock can with propriety be introduced into a plantation, at least not till the trees are well grown, there seems no particular room for choice of the under herbage: the smooth underwoods should be encouraged, and briers and brambles, if they appear, should be grubbed up, as making the plantation inaccessible even to its owner. I think ivy injurious to the growth of timber trees; as

clipping, confining, and fretting its supporting plants, and therefore that some attention should be given to clearing it away before it has too long established itself, otherwise, becoming a kind of garment, the stripping it off may starve, and in that way injure the main plant. When timber trees in a plantation increase in size, they should be gradually thinned, by weeding out the underlings, and inferior species, and that annually, or by degrees; as the making too large an opening at once may let in too much cold air, and starve the plantation. I shall conclude the whole with a short list of herbs, or plants peculiar to, or commonly found spotaneous in woods, so far as I have observed them, and growing there without the aid of the owner, or planter.

1. Enchanter's nightshade (*Circæ lutetiana*), woods in Bedfordshire and elsewhere; not uncommon.

2. Wood reed (*Arundo arenaria*).

3. Woodreoffe (*Asperula odorata*), common in many woods; in Enfield pleasure grounds, Staffordshire, very plentiful.

4. Wild angelica (*Angelica sylvestris*), common in woods and hedges, and having the same properties in an inferior degree, with the garden angelica.

5. Solomon's seal, or wood lily (*Convallaria*), woods in various parts of the kingdom.

6. English hyacinth, harebell (*Hyacinthus non scriptus*).

7. Willow herbs (*Epilobiums*).

8. Bilberry (*Vaccinium myrtillus*), in moist woods.

9. Wintergreen (*Pyrola*), woods in the moorlands of Staffordshire.

10. Wood sorrel (*Oxalis acetosella*), very common.

11. Wood spurge (*Euphorbia amygdaloides*), wood, in a clayey soil frequent; Needwood forest, Staffordshire, plentifully.

12. Raspberry, dewberry, and common bramble (*Rubus's*), common in most woods, one or more of the species.

13. Strawberry (*Fragaria vesca*), common in woods.

14. Tormentill (*Tomentilla reptans*), very common.

15. Herb bennett (*Geum urbanum*), common.

16. Wood anemone (*Anemone nemorosa*).

17. Wood crowfoot (*Ranunculus auricomus*), common in woods on a clayey soil.

18. Stinking hellebore (*Hellebore fœtidus*), in woods in many parts of the kingdom.

19. Wood sage (*Teucrium scorodonia*).

20. Betony (*Betonica officinalis*).

21. Hedge nettle (*Stachys sylvatica*).

22. Bastard baum (*Melittus melissophyllum*).

23. Cow grass, or cow wheat (*Melampyrum pratense*), very common in many woods, and said to be an excellent cow herbage, but not much found in pastures.

24. Figwort (*Scrophularia nodosa*).

25. Coral wort (*Dentaria bulbifera*).

26. Pea everlasting (*Lathyrus sylvestris*) a luxuriant plant. I observed it in Lord Winchilsea's woods in Rutlandshire, stem 5 or 6 feet long.

27. Wood vetch (*Vicia sylvatica*).

28. Wood peaseling (*Orobus sylvatica*).

29. St. John's wort (*Hypericum perforatum*).

30. Shrubby hawkeweed (*Hieracium sabaudam*).

31. Saw wort (*Serratula tinctoria*).

32. Hoary groundsel (*Senecio erucifolius*).

33. Golden rod (*Solidago virgaurea*).

34. Butterfly orchis (*Orchis bifolia*).

35. Twayblade (*Ophrys ovata*).

36. Sedge grasses (*Carex's*), several sorts.

37. Spurge olive, and spurge laurel (*Daphna mezereum*, and *laureola*).

These are the most common plants, spontaneously produced in our woods, without reckoning the timber or underwood species; many other sorts are to be found there, which are either less common, or have not come under the writer's observation; also many plants commonly deemed weeds, are omitted in various parts of this paper, as not being, to the writer's knowledge, particularly injurious in any kind of cultivation.

No. XVI.

An Essay on the Production and Consumption of Corn in Great Britain; its Population at different Periods; the Means of increasing Human Subsistence; and of preventing future Scarcities. By Mr. William Pitt, *of Wolverhampton.*

CHAPTER I.

Export and Import of Grain from different Authorities, and Prices at different Periods; Discussion on the good or bad Policy of importing Corn; some Causes of Importation.

In 1688 was granted the parliamentary bounty upon the exportation of corn. This was done at the instance of the country gentlemen, as an expedient to raise the price; yet the price seems to have been low under this bounty for a number of years, particularly of the succeeding century; the price was then 28*s.* the quarter; the bounty was to take place till wheat was so high as 48*s.* the quarter; when above that price the bounty was suspended. The average price of the best wheat in Windsor market, from 1688 to 1700 inclusive, according to Dr. Smith, was

	5*s.* 9½*d.* per bushel.
From 1700, to 1764 inclusive, - -	4*s.* 6*d.*
From 1731, to 1740 inclusive, - -	4*s.* 2*d.*
And from 1741, to 1750, - -	3*s.* 9*d.*

During this latter period of ten years, the quantity of grain exported, it appears from the Custom House books, amounted to no less than eight millions, twenty nine thousand, one hundred and fifty six quarters, one bushel. The bounty paid for this amounted to £.1,514,962 17*s.* 4½*d.*

In 1749 Mr. Pelham, then Prime Minister, informed the House of Commons,

that for the three years preceding, a very extraordinary sum had been paid as bounty for the exportation of corn; in the following single year, 1750, the bounty paid amounted to no less than £324,176. 10*s.* 6*d.*; yet the average price of the best wheat for that year in Windsor market was only 3*s.* 7*d.* per bushel.

The above particulars are from Dr. Smith, on the Wealth of Nations; from whom also I extract the following.

The proportion of the average quantity of all sorts of grain, imported into Great Britain, to that of all sorts of grain consumed, does not exceed that of one to five hundred and seventy; and the average of all sorts of grain exported from Great Britain does not exceed the one and thirtieth part of the annual produce. No date is affixed to these calculations, but it shows that for the time for which they were made, the exports had been to the imports, nearly as nineteen to one.

The 13th of the present King, c. 43, seems to have established a new system with regard to the corn laws; in some respects better than the ancient one, but in others perhaps not quite so good. Thus far Dr. Smith.

I was surprised to find in Mr. Malthus's Essay, on Population, Chap. X. an extract from Dirom on the corn laws, stating, that before the year 1650, the average price of wheat per quarter had been £6. 8*s.* 10*d.* or per bushel 16*s.* 1¼*d.* this must have been owing to the neglect of cultivation, during the civil wars preceding that period.

From 1650 to 1700, by the same authority, the average price of wheat per quarter was £3. 0*s.* 11*d.* which is 7*s.* 7*d.* per bushel. This is very high for that period of time, and in the then state of population and commerce. From 1710 to 1750, the average price was so low as £1. 16*s.* per quarter, or 4*s.* 6*d.* per bushel, during forty years: this was the period of our greatest exportation, and during the whole period the export bounty existed; the exports have since been gradually decreasing, and the imports increasing. The average price of wheat for forty years, ending 1800, was £2. 9*s.* 5*d.* per quarter, or per bushel 6*s.* 2*d.* and for the last five years of this period £3. 6*s.* 6*d.* or per bushel 8*s.* 4*d.* nearly. The balance on the import side has been very high, and the dreadful fluctuations of price, which have occurred of late years, are but too well known. Mr. Malthus.

The following particulars of the corn trade are taken from the Annals of

Agriculture, into which work they had been introduced, from the most authentic documents as follows.

From 1st Report of the Committee of Waste Lands, Annals, vol. 28, p. 498.

For nineteen years, ending 1765, Great Britain gained by its corn trade upon an average per annum, £651,000.

From 1765 to 1776, the exports and imports became nearly equal; in 1777 they are stated as follows.

Exports	*Qrs.*	*Imports*	*Qrs.*
England	296,721		504,982
Scotland	10,569		159,455
	307,290		664,537
			307,290
		Excess of Import	357,147

Which at 3 quarters per acre is the growth of 119,049 acres.

From this time a regular import has been continued almost uniformly to the present, but greater in some years than others; for twenty years, ending 1797 the

imports have have amounted to	£15,139,176
and the exports to	6,588,171
Balance	8,551,005
Loss per annum £	427,550

But the import prices being calculated at values established at the revolution, the imports have not cost less at a moderate estimate than per annum £600,000

to which add loss of export	651,000
makes a difference per annum of	£1,251,000

Quantity of land necessary to produce the balance of grain imported during twenty years to 1797.

	Qrs.	At per acre.	Acres.
Wheat	2,893,589	3 Qrs.	964.529
Wheat flour	-	-	96,880
Rye	390,504	2½	156,208
Oats	8,655,046	4½	1,923,342
Oatmeal	-	-	5,535
Beans	244,581	4	61,145
Pease	35,186	2½	14,074
	In twenty years		3,221,713
	Per annum		161,085
Balance of barley and malt exported per annum at four quarters per acre.			13,021
	Remains balance per annum		148,064 acres.

But the imports during the latter part of this period were greatly increased, those of the year 1796 being nearly one fifth of the whole, and having cost the nation, bounties included, about £4,500,000, and those of the four last years taken together amounting to upwards of nine millions, and requiring the average growth per annum of about 286,000 acres of land.

Imports 1796, much the greatest which had ever been known.

	Quarters.	s.	£.	Crop per Acre.	Acres necessary for growth.
Wheat	814,265 at	60	2,442,795	3 qrs.	271,421
Wheat meal	204,469 cwt.	24	245,362	- -	20,446
Barley	37,468 -	25	46,835	4 -	9,367
Rye and meal	157,802 -	40	315,604	2½ -	65,055
	11,611 cwt.	15	8,707		
Oats	740,348 -	18	666,313	4½ -	175,175
Oatmeal	95,688 cwt.	8	38,355		
Beans	35,203 -	25	44,003	4 - -	8,803
Pease	32,669 -	45	72,505	2½ - -	13,067
Maize and Meal	22,410 -	30	33,615	3 -	10,051
	20,651 cwt.	12	12,390		
			3,926,484	Acres	573,385
	Import bounty		573,418		
	Total		£.4,499,902		

It futher appears by accounts laid before the House of Commons by Mr. Chalmers, that in five years ending in 1800, (which of course includes the year 1796 stated above) the average imports exceeded the exports per annum by about 470,000, qrs. which at 3 qrs. per acre, is the annual growth of 156,666 acres; and the imports of 1801 were great beyond all former precedent; they are stated for one year, ending October 1801, as follows:

	Quarters	per bushel s.	d.	Amount £.	per acre Qrs.	Acres necessary
Wheat and meal	1,573,729	16	1	10,124,322	2½	629,490
Barley	175,323	9	0	631,162	4	43,830
Oats	685,457	4	10	1,325,216	5	137,091
Beans	18,680	8	6	62,312	4	4,670
Peaso	48,729	9	4	181,920	3	16,243
Rye and meal	121,244	12	3	594,088	3	40,414
	Qrs. 2,623,162			£.12,919,020		Ac. 871,738.

Besides Indian corn 41,240 qrs. ditto meal 108,777 cwt. and rice, 260,383 cwt. and the bounties paid on two years importation of corn and rice, ending October 10th. 1802 amount to £.2,166,875.

The prices of corn between 1796, and 1800 were moderate, the following are the average prices of the kingdom to the present time.

	Wheat	s.	d.		Wheat	per bushel.	
1797	Wheat per bushel	6	6	1801	March	19	3
1798		7	0		June	16	1
1799	Lady Day	6	3		September	11	1
	Michaelmas	9	0	1802	Whole year's average	8	4¼
	Christmas	13	0	1803	ditto	7	0
180	Michaelmas	13	3	1804	First seven months ditto	6	6
	Christmas	16	4		Last four months	10	9
				1805	Year's average	11	0

Upon the whole, it may be concluded from these authentic documents, that the consumption of grain in Great Britain, upon an average of the last 25 years, has exceeded its own growth by the annual produce of about 200,000 acres of corn land, and that the amount of such importation has considerably exceeded, during that period of time, one million per annum.

Respecting the bad policy, or national evil, of importing corn, there are different

opinions: the late Joseph Wilkes, Esq. of Measham, Derbyshire, who was a deep thinker of sound judgment, and well acquainted, both theoretically and practically, during a long and active life, with the principles of agriculture, trade, manufactures, and commerce; and whose extensive and successful practice, in many branches of commercial economy, must give weight to his opinions, maintained at the time of the greatest importation (Michaelmas, 1801), that such importation was no great evil, inasmuch as it was paid for by our manufactured goods; that it was even less an evil than a scarcity of the raw material of manufacture; and he considered the necessity of importing wool, hides, &c. as a greater evil than the importation of corn; and I have always understood, that the great importation of corn from America, in 1801, was chiefly or wholly paid for by woollen cloths and other manufactured goods; and that it occasioned the greatest export of woollens ever known; and that the Americans so completely drained themselves of corn for this traffic, that bread became as dear, or dearer, at New York, than it was in England.

On the contrary, Mr. Malthus, in a note to his chapter on the exportation of corn, p. 467, seems to consider the permanent and increasing necessity of an importation of corn, to be a symptom of the decline, decay, and downfall of a state; he says, "Poor countries have been continually rising on the ruins of their richer neighbours; upon the commercial system, this kind of succession seems to be in the natural and necessary course of things, independantly of the effects of war. If from the increasing riches of the commercial part of any nation, and the consequent increasing demands for the products of pasture, more lands were daily laid down to grass, and more corn imported from other countries, the unavoidable consequence seem to be, that the increasing prosperity of the poorer country, which their exportation of corn would contribute to accelerate, must ultimately destroy the population and power of the countries which had fostered them:" and farther, "The most determined friend of commerce and manufactures must allow, that the persons employed in them cannot exist without the food to support them; and I cannot persuade myself to believe, that they can be sufficiently secure of this food, if they depend for it principally on other countries. There has never yet been an instance in history, of a large nation continuing with undiminished vigour, to support four or five millions of its people on imported corn; nor do I believe there will be such an instance in future; England is, undoubtedly, from her insular situation and commanding navy, the most likely to form an exception to this rule.

In spite, however, of the peculiar advantages of England, it appears to me clear, that if she continue yearly to increase her importations of corn, she cannot ultimately escape that decline which seems to be the natural and necessary consequence of excessive commercial wealth; and the growing prosperity of those countries which supply her with corn must in the end diminish her population, her riches, and her power. I am not now speaking of the next twenty or thirty years, but of the next two or three hundred.

He further says, "When Rome adopted the custom of importing all her corn, and laying all Italy into pasture, she soon declined in population;" and again, "In the history of the world, the nations whose wealth has been derived principally from manufactures and commerce, have been perfectly ephemeral beings, compared with those the basis of whose wealth has been agriculture."

Without entering farther into this question, it certainly seems desirable, that a country possessing extensive territory, should endeavour to supply itself with the absolute necessaries of life; and rather depend upon importation for its superfluities and luxuries, than its means of subsistence.

The state of facts, respecting the export and import of corn, appear to be nearly as follows:

That for ten years preceding 1750, the bounty paid on exportation, on an average exceeded £. 150,000 per annum, which, at £ 5. per quarter, must have been 600,000 quarters, and, at 3 quarters per acre, must have been the annual growth of 200,000 acres. I am aware that the whole of this was not wheat; but as in the inferior sorts of grain the bounty was less, and the acreable produce more, the bounty upon the growth of an acre of each might be nearly the same; I will therefore suppose the bounty to have operated as 15*s.* upon the growth of every acre exported.

Dr. Smith says, the exports were the one-and-thirtieth part of the annual produce; upon this data, the growth of all sorts of grain in England, at that time, was 6,200,000 acres. It also appears, from Dr. Smith, that the real quantity of grain exported during that period amounted to upwards of 800,000 *qrs.* per annum, upon the average: as I cannot suppose the average produce of that time to have exceeded $3\frac{1}{2}$ *qrs.* per acre, the export must have been the annual produce of about 230,000 acres of land.

For 19 years, ending 1765, the export of grain amounted to the average, per

annum, of £651,000.; the average price of wheat, during that period, was about 4*s*. per bushel; supposing the average value of grain to have been £. 5 per acre, the average annual export must have been the growth of about 130,000 acres.

From 1765 to 1769, the average annual export was reduced to 114,531 *qrs*. at 3 *qrs*. per acre, the produce of 38,177 acres.

From that time to 1774, it fell to 52,590 *qrs*. or 17,530 acres.

Thence to 1779, the balance turned the other way, and the annual average import was 34,721 *qrs*. or, at the above rate, the growth of 11.573 acres.

The alteration in the corn laws, 13 *Geo*. III. 1773, seems to have been a very unfortunate interference of Government; the trade was then of itself expiring, and its death blow was given, or seems to have been given, by that alteration: the home consumption was become nearly equal to the growth, when, instead of encouraging that growth by extending the means of carrying it to market, a sudden check is given by enacting, that it shall not be carried to a foreign market at all, till the home consumption is first supplied at a lower price than formerly (although rents and expenses were then rising), for such is evidently the effect of lowering the bounty on export price of wheat, from 48*s*. to 44*s*. the quarter.

For 5 years, ending 1784, the annual average import was 86,429 *qrs*. or, at the above rate, the growth of 28,810 acres.

The loss of export, and commencement of import, seems to have taken place about the years 1775 or 1776, two or three years after the above alteration in the corn export laws; and may be in part fairly attributed to that alteration, discouraging the growth of wheat, in part to the increased demand in consequence of an increasing population, and in part to the encouragement given to grass land, in consequence of an increasing demand for cheese, butter, and butcher's meat, from a more numerous and wealthy population.

For 20 years, ending 1797, the average annual import has been before estimated at the growth of 148,064 acres.

For the single year 1796, part of the above, the import of grain is estimated at the growth of 573,385 acres.

For 5 years, ending in 1800, which also includes the above year 1796, the average annual imports are estimated at the growth of 156,666 acres.

For the single year 1801, was imported the growth of 871,738 acres.

And the bounties paid upon importation, for two years, ending October 10th, 1802, amount to £ 2,166,875.

The extraordinary imports of 1796 and 1801, must be attributed to unkindly seasons, and deficiency of crops; but the regularly increasing and permanent imports, for the last 30 years, must be owing to more permanent causes, which must be sought for in the extended commerce, and consequently increased wealth of the nation; in an increased population, and the introduction of more luxurious modes of life than were in use formerly.

The war which terminated soon after the commencement of the present reign, left the nation in possession of very extensive territorial possessions in the East and West Indies, of a powerful navy, a numerous assortment of merchant ships, great capitals and spirit of enterprize, and brought into the country an influx of wealth, acquired during a successful war: this becoming more generally diffused, and the returns from commercial speculations coming round, occasioned the introduction of a more profuse mode of living, a greater demand for, and increased consumption of butcher's meat, and other animal food, and particularly of butter, which (from the more general introduction of tea, which about this time took place in the country), was now required by every family, and in consequence more land is laid to pasture, and that of the best quality; and the growth of corn, without being extended, is thrown upon inferior land. There is great reason to believe that the acreable growth of corn, upon an average of the first half of the last century, was at least equal to that of the latter half; in the former period was often exported annually the produce of more than 200,000 acres; in the latter, for many years has been imported annually the produce of 200,000 acres; the crops of the latter period have certainly produced more per acre than of the former; these circumstances are accounted for by the increased consumption of an increased population of two millions of people which took place in the latter part of the century; the consumption of the produce of grass land within fifty years, I look upon to have doubled.

By the very general spread in the use of tea, which has taken place since 1750, at least in the internal of the kingdom, the demand for butter has in consequence increased so as to advance its price, in the proportion of one to three or four, although the production of that article is very greatly increased in quantity, and large importations made from Wales and Ireland.

The extension of commerce occasioned a very rapid and great increase of manufactures, and commercial as well as general population, which is a principal subject of the next chapter.

CHAPTER II.

Population of Great Britain, and Calculation of that of England at different Periods, from the Revolution; Consumption of Wheat at different Periods of Time, and Quantity of Land necessary to produce it.

The increase of population in Great Britain has been supposed not exactly uniform, but in some degree accelerated, owing to the superior healthiness of later times; this may be attributed to various causes, as firstly, the introduction of small pox inoculation, the consequence of which, from the middle of the last century, has been the preservation of the lives of great numbers of children, and rearing them to maturity; other causes may also be, improved diet and increased cleanliness, by which putrid disorders are become less frequent and less fatal; also, the drainage of bogs and marshes, and an improved regimen, by which agues and intermittents are almost entirely banished; a more rational and improved practice of medicine has, very probably, had its effect in removing disease, and prolonging human existence; and, lastly, I should hope, increased prudence and caution have had some effect for the better on laxity of morals, and its consequences.

That there has been a very considerable positive increase in our population, is now proved beyond all manner of doubt, by the returns on the population act; this had been before called in question by some, but it was apparent to the slightest observation, in all our mining countries, manufacturing towns, and their vicinity. The present population from the late parliamentary inquiries, has in the different accounts I have seen, been somewhat differently stated, although the differences are not very considerable: in one account, published in the Monthly Magazine, said to be by authority of the House of Lords, the population of

England alone is stated at - - - -	8,322,545
That of Wales at - - - -	544,375
And that of Scotland has been supposed about - -	1,600,000
Total Great Britain -	10,4[illegible],920

In another account the numbers employed in agriculture are stated at 1,524,227

And those in trade at - - - - - 1,789,531

Omitting, I suppose, those in the higher classes, and those in professions, inactive persons, children, and those without employment, if we proportion the agricultural and commercial population of England by these numbers, and reduce the whole to eight millions, it will be nearly thus:

The agricultural population - - - -	3,680,000
The commercial population - - - -	4,320,000
	8,000,000

As those who are inactive, or without employment, must generally depend upon either agriculture or trade for their support, or upon income derived from one of these sources, they may fairly be classed under those heads, though not actually employed therein.

The agricultural population is - - -	46 in a 100
The commercial population is - - -	54 in 100
In this last account the population of England is -	8,331,434
The number of houses 1,467,870, and of families -	1,778,420

In Observations on the Poor Laws, by the Right Hon. Geo. Rose, M. P. as quoted in a Review, the population of England and Wales is stated at 8,872,980

Square miles 55,833; inhabitants to a square mile - -	152
France contains upon a square mile, by Sir John Sinclair, -	157
Naples, by the same authority, - - - -	203
China, from Mr. Malthus, compared with France, - -	251

The ratio of our increase has been calculated to have been different at different times; Dr. Short calculated, for the former part of the last century, the proportion of annual births to deaths as 11 to 10, and the births at one twenty-eighth part of the whole population, which proportion Mr. Malthus approves: the annual births have since been reckoned at one thirtieth part of the whole population, and the deaths at about one thirty-sixth, for the middle of the last century; but, by the late returns on the Population Act, the country is supposed much healthier, and the annual deaths are reckoned not to exceed one fortieth part of the whole population. Mr. Malthus is of opinion that our late increase of population has arisen not from an increase of births, but from a diminution of deaths; agreeable to which

idea, the births are taken for a former period at one twenty-eighth, and for two later periods at one thirtieth part of the whole population.

As it is of importance to some following calculations to ascertain the population of the kingdom at different periods, I have calculated upon the foregoing data for England only from the time of the operation of the late Population Act, or thereabouts, back to the Revolution, by dividing the time elapsed into three periods, as follows: from 1688 to 1802, 114 years, three periods of 38 years each.

First period, from 1688 to 1726, births to deaths as 11 to 10; annual births one twenty-eighth of the whole population; annual increase about one three-hundredth part of the population; which, in this proportion, would double in about 250 years.

Second period, 1726 to 1764, annual births one thirtieth, deaths one thirty-sixth of the whole population; annual increase about 180th part of the whole; period of doubling 125 years.

Third period, that of our greatest increase, 1764 to 1802, annual births one thirtieth, deaths one fortieth part of the whole population; annual increase the one hundred and twentieth part of the whole, and period of doubling 83½ years. This is estimated to be our present situation; but at times, interrupted by dearness and scarcity of food, and other checks, to increase.

By calculating back on the afore-mentioned data, the population of England in

1688 was 4 millions ½ - - - -	4,333,333 persons.
In 1700 it was increased to - - -	4,500,000
In 1707, the middle of the first period, it was -	4,616,000
In 1726, the end of the first period and beginning of the second	4,917,484
In 1745, the middle of the second period -	5,463,237
In 1764, the end of the second period and beginning of the third	6,069,557
In 1775, when our exportation ceased - -	6,649,702
In 1783, the middle of the third period - -	7,006,588
And in 1802, the end of the third period -	8,320,000

agreeing nearly with the returns on the Population Act. By this estimate our present natural annual increase is 69,333, and our population, as before, would double in 83½ years; but Mr. Malthus observes, that we cannot reasonably suppose, that the resources of this country should increase for any long continuance with such rapidity, as to allow of such permanent increase of our population.

To estimate the consumption of corn, and other landed produce, by our present population, if we leave out the odd 320,000 for young children, who consume but little, there remains to provide for the consumption of eight millions of people.

In our present established modes of living, bread is an indispensable article, of which every one expects his fill, which cannot in general be restrained, or limited in quantity, without causing clamour and complaint; and this generally made of good wheat, without any mixture; the quantity made from oats, barley, and other grain or pulse, being but a small proportion of the whole. Respecting the quantity necessary to each individual, various estimates have been formed; eight bushels per annum has been reckoned, but this is certainly too much, and more than necessary. The late Dr. Withering reckoned that a labouring man, who lived chiefly on bread, would consume a pound weight per day; this allowance for a year would, I believe, be made from six bushels of good wheat; but women and children require, in general, less. In a Report from the Birmingham Union Mill, a quartern loaf and a half per week, to each individual of a family, is stated as a good allowance; and this agrees with my own observations upon the consumption by grown persons; but I think that children and old persons require less, where they have plenty of potatoes, as well as others who have plenty of animal food and beverage; and am of opinion that to one half of mankind, the full grown, healthy, and active, one pound of bread each per day may be required; and that to the other half, women, children, and those who have plenty of other food, $\frac{3}{4}$lb. per day is sufficient, making the average 14oz. per day, or 320lb. per annum.

The average produce of wheat, over and above the seed, does not much exceed 20 bushels per acre of 60lb. each, and I fear falls short of that quantity in unproductive seasons; taking that for the average, an acre of wheat is 1200lb. weight, and will produce an equal weight of bread; for what it loses in the husk, or bran, it regains in the moisture, leaven, or fermentation: thus 70lb. of good wheat will make full 56lb. of flour, and 56oz. or $3\frac{1}{2}$lb. of flour makes a quartern loaf of 70oz. or 4lb. 6oz.; an acre of wheat, as above, (rejecting fractions), may therefore be reckoned to supply for one year four persons, when a good crop; or the supply of the present population of the kingdom requires, in a good average year, at least two millions of acres of wheat.

In 1775, when our exportation ceased, the population of the kingdom, as above,

was 6,649,702 persons, and could, if we deduct, as before, one twenty-fifth part for young children, be supplied from 1,600,000 acres of wheat.

But as I fear a good average year does not exceed the above stated acreable produce, and some years may fall considerably short of it, even by one third of the whole, though a very productive year may exceed it, I believe we need make no deduction for infants, but may conclude that the regular supply of the kingdom requires a growth of wheat upon a number of acres equal to one fourth of its whole population, or in 1802 - - - - 2,080,000 acres.

And that in 1775, when the export ceased, the required growth was not more than - - - - } 1,662,425

making an increased growth necessary of - - 417,575 acres.

If these calculations are well founded, as I suppose and believe they are, we need no longer wonder at the loss of our export of corn; or at a regular necessity for importation, and occasionally (in unproductive seasons), of a great quantity of this article; more particularly when it is considered that the demand for the produce of grass land has so increased as to occasion a large proportion of our most fertile land to be converted to pasture, and that it pays better so applied than in cultivation.

As our population has the same tendency to increase as heretofore, and which nothing in the natural course of things is likely to prevent, but the intervention of some public calamity, as internal war, commotions, disease, or scarcity of provisions; and as the ratio of this increase has been ascertained to have been, in our most flourishing state, the one hundred and twentieth part of the whole annually, a necessity becomes evident, if this flourishing state of the nation is to continue, of adding constantly and annually the same proportion to the national stock of provisions, and this is not only in the article of grain, but in every other article of necessary subsistence, otherwise privations and scarcity become a matter of course; but this I believe the territory of this island is capable of producing for a great length of time.

It has been above ascertained that the growth of wheat necessary to supply the present demand, requires the annual growth of full two millions of acres; and to insure a sufficient supply, the growth should be gradually extended to two millions

and a half of acres. I estimate that at present the wheat crop, and fallows for wheat, occupy an extent of three millions of acres.

CHAPTER III.

Butcher's Meat, Cheese, Butter, Beverage, Vegetables, and Land necessary to supply the present Population, and Modes of Living.

Butcher's meat is the next most important article of subsistence, and the demand for which throughout the kingdom has doubtless been greatly increasing. I calculate that the individual consumption of bread, per head or per family, is not greater now than it was half a century ago, but that the demand per family for butcher's meat has increased, in consequence of increased luxury, the effect of increased wealth, the consequence of extended commerce, increased manufactures, and improved agriculture.

To come in some degree at the national consumption, suppose each individual to consume half a pound per day, including pork or bacon, which is no very great allowance, and though I fear many are, from necessity, compelled to take up with a smaller proportion, yet I suppose this to be balanced by the excess, superfluity, and luxury of others; half a pound per day is 182½ lbs. per annum, which is more than an acre of average land will produce, either in beef or mutton, supposing the stock bred, reared, and maintained on the land; and as a large proportion of the land where stock is bred and reared is of an inferior quality, it is very probable that the rearing and feeding of live stock, for the supply of butcher's meat for eight millions of people, will require one acre and a half to each individual, or twelve millions of acres of land, of the quality of our inclosed pasture land, as a considerable proportion of land where stock is bred and reared is often of an inferior quality, though they are fatted up and finished upon the best land.

Cheese, 1 lb. weight per week to each individual, and 500 lb. weight made from a cow, consuming the produce of three acres, viz. two acres for pasture and one for hay, would be nearly in the proportion of one cow, from three acres, supplying ten persons, as I suppose children and some others may require less cheese if they are allowed milk; I will suppose cheese and milk supplied as above, then those

articles for the whole kingdom require eight hundred thousand cows, and two millions four hundred thousand acres of pasture and hay ground.

Butter, as tea is very general, the poorest family of five persons must, if possible, have one pound of butter per week; and I suppose the average consumption to be at least one pound and a half per week to five persons; to avoid fractions suppose 75lbs. per annum to five persons, and 250lbs. per annum to be the produce of a cow from three acres of land; then three cows from nine acres will supply fifty persons, and the supply of the kingdom will require 480,000 cows, and 1,440,000 acres of land for hay and pasture.

Brought down dairy ground for cheese and milk -	2,400,000 acres.
Ditto for butter - - -	1,440,000
In all -	3,840,000

As the produce is here put high, and I believe above the average of the kingdom, I think we may take the dairy ground necessary to supply the present mode of living at 4,000,000 of acres, or half an acre to each individual.

Beverage.—The general beverage of this country, or that in use amongst the bulk of mankind, is malt liquor; even in the cyder countries a good deal of this beverage is consumed. The annual consumption of the kingdom was stated by Mr. Addington, when minister, in 1802, upon his proposal for raising annually two millions by an additional malt-tax, at 10*s.* per quarter; this gives 4,000,000 of quarters, or 32,000,000 of bushels. The average produce may be between three and four quarters per acre; but, as in the dressing up of barley for sale by the farmer a proportion of nearly one-tenth of the whole is taken off as tail end, and not applied to malting; as a part of the crop too, in one county or other, is in almost every season weathered, or mow burnt, and in consequence given to live stock, I believe the annual growth cannot require less than a million and a half of acres of land.

Vegetables for mankind.—The consumption of potatoes, at one pound weight per day to each individual, will require the annual growth of upwards of 130,000 acres of land; if to this we add that of all other garden vegetables, we may reckon the whole of the growth of 500,000 acres.

Quantity of Land necessary to subsist 8 *Millions of People in England, according to their present Mode of Living.*

	Acres.
Bread corn and fallows for wheat - - -	3,000,000
Barley ground for beverage - - - -	1,500,000
Potatoes and other vegetables - - -	500,000
Grass land, or green coops, for breeding, rearing, and fatting live stock for butcher's meat - - - -	12,000,000
Grass land for dairy cows - - -	4,000,000
For the support of human kind -	21,000,000

CHAPTER IV.

Horses, their use cannot be dispensed with; Estimate of the Number kept in England; how far the Number may be reduced; their Consumption of Landed Produce; general Consumption by Men and Horses.

The consumption of landed produce by horses has been much complained of, as interfering with the subsistence of human kind; and they do, doubtless, consume the produce of a large proportion of the soil, as being an animal that requires to be pampered, and fed with some degree of luxury, to enable him to answer the demands for strength and speed, that are frequently required of him; but I fear that in the present state of human society in England, or till some alteration shall happen in it for the worse, the extensive use of this animal cannot be dispensed with.

The number kept in England has been variously calculated, though I suppose it may be nearly known by the horse duty, although it is very probable a certain proportion may have been omitted entering; and it might tend to throw some light on this subject if the Board, who have undoubtedly the means, would procure the number subjected to that tax; the writer of this has no means of access to such particulars, or he would have been glad to have availed himself of it upon this occasion. The number of all sorts kept in England has been reckoned by Mr. Mackie, Annals of Agriculture, vol. xxviii. p.382, at two millions; and this estimate

has been copied and calculated upon, but I believe this calculation to be very erroneous, and a great exaggeration, and that the real amount does not exceed half that number.

In the present state of society, and its relative situation, respecting agriculture, trade, manufactures, and commerce, great numbers of horses are necessary in the conveyance of provisions, minerals, manures, metals, timber, raw materials of manufacture, goods, merchandize, fuel, and a great variety of heavy articles, often conveyed to great distances; the number of heavy carriages in all directions to and from London; and the same upon a smaller scale to and from all other populous cities and towns; the internal carriage within such places, by dray horses, with fuel, goods, merchandize, and from warehouses and wharfs in all directions; the numbers employed on rivers, canals, and in mines; the necessary conveniences and accommodations for travelling, in mail and stage coaches, chaises, hackney coaches, and other vehicles; the numbers kept for convenience, pleasure, and luxury, as hackneys, coach-horses, hunters, and racers; the supply for the army and its dependencies, as yeomanry, volunteer cavalry, &c.; these require a great supply of horses, and that supply must be obtained from the land, and consequently either from agriculture or grazing, as it can be obtained from no other source, and in this respect agriculture may be considered as a nursery for horses wanted for other purposes.

It may be objected, that many of these classes of horses might be well spared, and that some of them are useless; but it cannot reasonably be expected that even these will be given up, unless some violent convulsion should occur in society: those who have been used to the ease, convenience, and pleasure of riding, will not easily be induced to prefer walking on foot; and the conveniencies of easy and expeditious travelling, or even the pleasures and amusements to which horses are subservient, cannot be abandoned, without recurring towards a state of general poverty and unimproved society.

Respecting the precise number kept in England, it is very difficult to conjecture near the truth, but these estimates may be corrected by future information. I shall begin with those independent of agriculture, though they must be drawn originally from that source; and if they cannot be dispensed with, horses in agriculture are necessary, to produce those for other uses.

Estimate of the Number of Horses kept in England.

Classes.	No.
1. Draught horses, employed on roads, rivers, canals, and in mines, including cart horses in cities and towns - -	100,000
2. Coach and chaise horses of all descriptions - -	100,000
3. Hunters, racers, hackneys, and the army - -	100,000
4. Miscellaneous horses, to fill up vacancies of all sorts and descriptions - - - - -	100,000
5. Working farm horses. I know that seven such horses are fully sufficient for 100 acres of actual tillage, i. e. reckoning only crops and fallow; suppose one horse to 14 acres, and seven millions of acres - - - -	500,000
As a proportion of ploughing is now done by oxen, I believe this to be a liberal estimate.	
6. Colts of one and two years old for succession -	100,000
Total -	1,000,000

From this number I fear no great retrenchment can be made, in any thing like a flourishing state of modern society; as 50,000 colts, at least, must be bred annually, and the species is by no means prolific, but subject to barrenness, abortions, and accidents; I think that to cover such accidents, 100,000 breeding mares will be required, and that at the same time 100,000 more mares must be in existence, of improper age or form for breeding, as they ought not to breed before six or seven years old, and then the best only should be selected; and 200,000 mares seems to imply 200,000 horses; 400,000 of the species must therefore be in the farmers' hands, to answer the demand for other uses; the introduction of oxen can therefore only take place so far as to do the work of 100,000 horses.

Respecting the consumption of landed produce by horses, various estimates have been made, with very different results, and indeed the subject admits of great variation, as depending upon the manner in which they are supported; a young horse, or a play horse at grass, will consume little more than a beast or ox of the same age; a horse kept in the stable on hay and corn unlimited, comes under a very different denomination.

The first and second classes of horses in the above list, being almost constantly fed in the stable, and when at work compelled to great exertions, are therefore the greatest consumers; two bushels of oats and half a bushel of beans per week, are often allowed to these; this is 130 bushels per annum, and may be reckoned the produce of - - - - - 4 acres.

Hay, $1\frac{1}{2}$ cwt. per week, 3 ton 18 cwt. per annum - - 3

Per head - 7 acres.

In estimating the produce of hay ground, I reckon the average one ton per acre, and the after math one third of the hay; whole produce, therefore, 1 ton $\frac{1}{4}$ per acre, or rejecting fractions, sufficient to supply a horse with half a hundred per week the year round. The produce of horse-corn I reckon at four quarters per acre.

Hackneys, and the best kept farm horses, have seldom so great an allowance of corn; one bushel of oats per week, and a peck of beans, is a good allowance for these, which is per annum 65 bushels, or the produce of - 2 acres.

Hay for 30 weeks, $1\frac{1}{2}$ cwt. per week, with a little in summer when taken to work from grass, in all - - - - 2

Summer pasture - - - - 2

Per head - 6 acres.

But a great proportion of farm horses are kept with much greater economy upon two quarters of a peck of corn per day, with plenty of chaff or cut straw when in the stable, and no corn when at grass, and are kept at grass half the year; this is only $22\frac{1}{2}$ bushels of corn per head per annum; but allowing $9\frac{1}{2}$ bushels additional, is the produce of - - - - - 1 acre.

Hay for 26 weeks, $1\frac{1}{2}$ cwt. per week - - $1\frac{1}{2}$

Summer pasture - - - - 2

Per head - $4\frac{1}{2}$ acres.

And a great many others are kept with still more economy; the consuming nature of pampered horses is well understood by the farmer, and restrained by all who attend to their own business and interest; and by the allowance of plenty of chaff and cut straw, and pease haulm, and other straw at times instead of hay

(which straw may be considered as compensated in their dung), the consumption of hay per head is reduced to - - - 1 acre.
Corn 1 acre; pasture 2 acres - - - 3

Per head - 4 acres.

And a farther saving is often made still, and the horse at the same time fed in greater plenty, by a practice which is worthy of more general, nay, universal adoption, and which would effect the greatest possible saving in the keep of horses; I mean the practice of what is called soiling, or giving green food, as lucern or vetches in the stable; a horse may be thus well summered with the produce of - - - - - 1 acre.
Hay 1 acre, corn with plenty of cut straw, 1 acre - - 2

Per head - 3 acres.

Young horses.—A colt, the first year, his keep may be reckoned half the mare's grass in summer, the mare doing half work - - 1 acre.
Grass, after weaning, half an acre; corn, first winter, half an acre 1

Per head - 2 acres.

Second year, grazing 2 acres, hay $\frac{1}{2}$ acre, corn $\frac{1}{2}$ acre; per head 3 acres.

From the above data, the consumption of landed produce by horses may be estimated as follows:

No.	Grass. Acres.	Hay. Acres.	Corn. Acres.
200,000 road and harness horses -		600,000	800,000
100,000 hackneys, and the army -	200,000	200,000	200,000
100,000 miscellaneous - -	200,000	150,000	100,000
Corn -			1,100,000
Hay -			950,000
Grass -			400,000
400,000 horses, employed otherwise than in agriculture, consume the produce of - -			2,450,000

Horses employed in Agriculture.

No.		Grass. Acres.	Hay. Acres.	Corn. Acres.
100,000	high kept farm horses - -	200,000	200,000	200,000
200,000	moderately kept - - -	400,000	300,000	200,000
200,000	economically kept - -	400,000	200,000	200,000
100,000	young horses for succession	175,000	25,000	50,000
		Corn -		650,000
		Hay - -		725,000
		Grass -		1,175,000
600,000	farming and young horses consume the product of			2,550,000
400,000	kept for other purposes, consume -			2,450,000
1,000,000	of horses, consume the product of - -			5,000,000
	of which pasture and hay ground is -			3,250,000
	Oats -			1,500,000
	Beans -			250,000
	Total as before -			5,000,000

From the above calculations it appears, that the consumption of landed produce by farming horses, including young stock, is not more than half the whole, for they do not come in for nearly half the horse-corn; and consequently, the greatest pressure upon the land lies from horses kept for luxury or pleasure, and commercial uses.

That the growth of horse-corn, as above, requires near two millions of acres, or an extent of land nearly equal to what is necessary to supply mankind with bread I believe there can be little doubt; in the tables of importation, oats often form the greater half of the whole, respecting land necessary to produce them; and in years of scarcity their deficiency is very great; in 1801 the importation of oats is stated at 685,457 *qrs.*; in 1796, at 740,348 *qrs.*; and the aggregate importation of oats for 20 years, ending 1797, amounts to the enormous quantity of 8,655,046 *qrs.*

	Acres.
Hence I conclude that the produce of land consumed by horses, is the growth of about - - - -	5,000,000
And by human kind, brought forward - - -	21,000,000
Land necessary to supply the present consumption	26,000,000
And that the land is occupied as follows, nearly:	
Bread corn, and fallows for wheat - -	3,000,000
Barley ground, chiefly for beverage - -	1,500,000
Potatoes, pease, and other vegetables for mankind -	500,000
Grain, and pulse, consumed by hogs and fat cattle -	250,000
Turnips and other green crops about - -	1,000,000
Oats consumed by horses; I suppose the oatmeal consumed by mankind, to balance the wheat bran, &c. consumed by horses -	1,500,000
Beans, and pulse consumed by horses - - -	0,250,000
In tillage, Acres - -	8,000,000
Grass land for cattle and sheep, the turnip land being deducted from the former estimate; also the grain and pulse consumed by hogs and cattle - - - -	14,750,000
Grass and hay ground, for horses - - -	3,250,000
Total as before, Acres	26,000,000

CHAPTER V.

Extent of Territory, cultivated and waste; Power of Increase, greater than Means of Subsistence; Periods of doubling a Population; means of Increasing supplies; waste Lands, Improvements.

The territorial extent of England alone, from a paper in the Monthly Magazine, there said to have been published by the House of Lords, is supposed to be 50,210 square miles, or - - - - 32,134,000 acres.

The extent of waste land from the best authorities, is supposed to be about one fifth of the cultivated land, or one sixth of the

whole; in the Annals of Agriculture, Vol. 24, is given an enumeration of its extent in the different counties, amounting to upwards of 6 millions of acres; to preserve even numbers, suppose - - 6,134,000

Remains cultivated land, Acres 26,000,000

Agreeing exactly with the estimate before formed from consumption; from which it appears, that the produce of the land under its present cultivation, is upon a balance with the consumption; and that it fluctuates to plenty or scarcity, merely by the impulse of a good or bad season.

Hence also appears the necessity, both of bringing more land into cultivation, and of improving that already in hand. This necessity will increase annually, and be more particularly felt in unproductive seasons, and particularly in the article of grain, whenever the whole produce shall fall considerably below average.

Mr. Malthus, in his Essays on Population, has brought out some remarkable, and rather striking conclusions; heretofore but little attended to, one of which is, that the prolific principle, or power of increase, throughout all animated nature, is greater, or operates faster than the means of subsistence; this principle wisely implanted by the Creator, to balance accidents, and insure the continuation of every species, is checked amongst animals by their being devoured by men, or by each other, or every pasture would be soon overstocked, unless checked by some extraordinary mortality; in the human species this tendency to increase is in proportion to the means of subsistence, or the ease and facility with which the necessaries and comforts of life can be acquired. Where no physical difficulties of this kind lie in the way, it has been calculated that the population of a country may be doubled in fifteen or twenty years; that of the American states is said to double in twenty-five years; and that of England as stated before, has been lately annually increasing, the one hundred and twentieth part of the whole, which if continued would double in eighty three years and a half.

It remains therefore to increase our supplies, not only for the present demand, but for one increasing in an accelerated proportion; a community can never be at a stand, or become stationary, without being in real distress; because nothing but real distress can produce such an effect. It is in the nature of all animated beings to be in motion, and of all well organized societies to increase and improve, and which, the means being in their power, is one main end of their existence.

In the present state of this country, the means of increasing human sustenance are various and extensive; the territory is so far from being exhausted, that it is not yet occupied; and the necessity of employing increased attention, and greater capital, in an extended and improved agricultural economy, will constantly become more pressing.

The waste lands of the kingdom, consisting of upwards of six millions of acres offer themselves as a natural resource; of these four millions at least are capable of cultivation; these should gradually and speedily be resorted to, and inclosed, improved, and cultivated; and the impracticable parts should be planted. This addition of land would very much extend our productive territory, and as it must be cultivated for tillage, would be a timely and desirable addition to our corn land.

Mr. Malthus observes, that "in any instance where a certain quantity of dressing and labour employed to bring new land into cultivation, would have yielded a permanently greater produce, if employed upon old land; both the individual and the nation are losers, by cultivating the new land."

In answer to this I must observe, that new land ought not to be improved at the expence or by neglect of the old, but in addition to it; and from new resources; as by marl, lime, and agricultural operations; and by degrees by dung and compost, made by live stock from its own produce; and not from manure produced by land before in cultivation; the labour and capital employed, ought also to be in addition.

The improvement of all land already in cultivation ought also to go hand in hand with the former; and our best land will perhaps often pay and produce more for attention and improvement, than that of inferior quality.

Mr. Malthus observes upon this point, "in countries possessed of a large territory, and with considerable quantity of land of a middling quality, the attempt to cultivate barren spots, and bestowing that manure and labour upon them, that would answer better elsewhere, is a palpable waste both of individual and national resources; especially as there must be a waste of seed corn."

To this I answer as before, that the improvement of inferior land, ought not to be at the expence of, or to interfere with, that of better land; but ought to be brought in addition; and improved from sources independant of such better land, by mineral produce, agricultural processes, and the dung and compost formed by

animals upon its own produce; in which case it must always be both a public and a private improvement.

The improvement of our cultivated land is now, doubtless, progressively going forward in regular gradation, and will accelerate as the demand for its produce increases. Mr. Malthus observes upon this, that "in an endeavour to increase the absolute quantity of provisions, we shall find, that as fast as we do this, the number of consumers will more than keep pace with it;" but farther, "we are not (on this account) to relax our efforts in increasing the quantity of provisions." By no means; as the strength and comparative consequence of every state must depend, in the first instance, on the number of its inhabitants; and that will depend on their means of subsistence. The necessity of attention to agriculture should be more generally inculcated, or will by degrees force itself more upon the attention of people of talents, education, and capital, who are capable, and have the means, of making the greatest efforts in improvement.

CHAPTER VI.

Improved Agricultural and Grazing Systems; Fallow Crops; feeding heavy Stock within Doors; Oxen and Horses; Tythes; Corn Laws; Bounty on Exportation; storing Corn, Public Granaries; Leases.

Although our system of agriculture has been already greatly improved from former times, yet it still remains very defective, and capable of much farther improvement. It is much lamented by many friends to agriculture, that we have still so great an extent of fallow ground, and that often upon our best and most fertile soils; and although the writer of this has some doubts whether fallows can be wholly banished at present with advantage from our strong, wet, and tenacious soils, or until they are more completely drained and ameliorated, yet he has not the least doubt but they may be very much reduced in compass, and that very much both to private and the public advantage.

The extent of fallow ground throughout the kingdom is very great; it is difficult to form any probable estimate; but if we suppose it to approach nearly to half the growth of wheat, it will amount to near a million of acres.

One of the greatest agricultural improvements of the last century, was the introduction of turnips, by which fallows have been very generally banished from light land; but as much the greatest proportion of the land of the kingdom is of a strong or heavy quality, yet very proper for the growth of wheat: the introduction of a good system, which would as generally banish fallows from heavy soils, would be a still much greater improvement.

In many of the common fields of the kingdom the soil is of a strong, deep, moist, yet rich, fertile, and productive quality, not easily exhausted if kept clean from weeds and couch grasses; for which purpose this land is fallowed every second, third, or fourth year, and often so imperfectly and incompletely done, that the purpose is but half answered: such land should be completely drained, and might be kept cleaner with a fallow crop, under active and spirited management, than it is at present with fallow.

Cabbages are well adapted for such land, if the allotment now used as fallow were well worked early in the spring, and then dunged, and thrown into two-bout, or four-furrow ridges, and planted with cabbages in June; this would be a very great resource either for fatting, or for dairy cattle, or for sheep. From Michaelmas to Lady-day, as the cabbages are cleared off, the ridges should be broken down for barley or oats, with which might be sown clover, or the land reserved for vetches at pleasure. As this land is with difficulty accessible in wet weather in winter, but would be more easily so after effectual drainage, the opportunity of frost for collecting a store of cabbages should not be lost; if, at other times, it cannot be approached with light carts, the use of asses and paniers has been found very effectual, and superior to all other methods of conveyance to moderate distances in dirty countries. It is surprising what effects have been wrought in the conveyance of brick for building, by women and children only, with this simple animal, so easily kept and cheaply supported. I believe half a dozen asses so worked would, in a season, convey the cabbages to a reasonable distance from a great many acres.

For continuing a supply of green food from Lady-day to May, part of the ground should be planted with Swedish turnips; these should be in rows in one-bout, or two-furrow ridges, and planted out in May, or early in June; in which way they will succeed well, and I believe it to be their best possible mode of culture. This practice is annually and successfully exemplified, by Mr. Tollett, of Swinnerton

Hall, Staffordshire, who has from ten to twenty acres of land annually in this culture; the plants being raised in a garden bed, give more time to clean and ameliorate the soil preparing for their reception.

Though the Swedish turnip is intended for late use, it may be cleared from off the ground at pleasure, as it will keep either in large or small heaps, or may be spread abroad on pasture land, without a necessity of being consumed immediately.

With the oat or barley crop may be sown, in part, clover, and part reserved for vetches, which may either be drilled in rows, or sown broadcast, as both are practised successfully; if in rows, it gives an opportunity of farther ameliorating the soil by hoeing, during the growth of the crop.

In some countries, where the treading of the land by horses is found serviceable to the succeeding wheat crop, the vetches may be eaten by tying them on the crop, as is now done; the same may be done by cow stock, or by hurdling sheep, or the vetches may be carried to the stalls at pleasure; clover may be consumed in the same way, and either the one or the other made into hay at the choice of the occupier.

Potatoes may also be grown upon suitable spots of land, either the same season with the cabbages, or with the vetches, either or both, as the cultivator may think proper.

The succeeding crop, or fourth in the course beginning with the fallow crop, is wheat; and as the alternate green crops would enable the occupier to support a much larger live stock than is done at present, and consequently to raise a much greater quantity of manure, there is no reason to fear any deficiency in the produce of wheat by this system, but, on the contrary, an increased produce.

The course of crops in this system would be as follows:

1. Cabbages, Swedish turnips, potatoes.
2. Barley or oats.
3. Clover, vetches, potatoes.
4. Wheat.

The supply of food for live stock would meet the demand for every part of the year; cabbages from Michaelmas to Lady-day, Swedish turnips thence to May, and vetches or clover May to Michaelmas, with hay and potatoes to use occasionally, would afford a constant and uninterrupted supply for every season.

If by these or similar means the fallows could be reduced one half, and by

degrees into a less proportion, the increased produce would go a great way towards meeting the increased demand; the way to introduce this must principally be, by the example of persons of influence and property, whose attempts in this way, if conducted with judgment, would be certain of success, and whose success would soon be imitated by others. I think one may venture to foretell, that if this or some other similar system be not voluntarily adopted, necessity will by degrees compel its adoption. I suppose we are in this part of our agriculture, much behind the ancient Egyptians, or the modern Chinese, whose population would not, and does not, admit of a large portion of their fertile land being artificially rendered unproductive; that the system is faulty and unnecessary, is proved by our own modern gardeners, who have no fallow ground, and whose land is yet by far the most productive this country affords.

Wheat on strong land in succession.—A system for this purpose has been for several years adopted, and successfully practised, by a very intelligent and respectable country gentleman of Shropshire, John Cotes, Esq. who has served his country in several successive parliaments; he has grown annually to the extent of sixty acres, and his crops have been constantly above average. About three or four years ago, Mr. Cotes personally shewed me his culture, which he declared his intention to persevere in, his average crops having been thirty bushels per acre. Mr. Cotes's land is of a pretty good staple, but I think not at all better than large tracts of the common field land of the kingdom, where fallowing is constantly practised. I named to him the horse-hoeing system of Tull, which he declared himself unacquainted with, and that his system originated in his own ideas.

The system of Tull very probably failed by the too great distance of the rows, and by applying it to light land, which, Mr. Cotes admits, is better managed in the turnip husbandry.

Mr. Cotes's system totally rejects fallow; even upon the breaking up of grass land, he would first take a broadcast crop, and after harvest pulverize the soil and draw it into two-furrow ridges, about eighteen inches asunder; the seed is then sown down the hollows, either by hand, which Mr. Cotes has not found tedious, or by a drill machine, moved by a roller and drawn by a horse going along one of the hollows; the seed is then covered by two slight furrows from either side the hollow, where the row is sown, and in spring horse hoed, by breaking down the remaining part of the ridge between the rows of corn; the remainder of the clean-

ing is done by hand, much more effectually than it can when sown broadcast; the ensuing year the rows of corn are of course transferred to the space unoccupied before, and so on alternately. Mr. Cotes conceives his method, instead of being more tedious, to cause a saving of labour; the land may be manured at pleasure, either down the hollows or after splitting the ridges; should the land be suspected of growing foul, Mr. Cotes has extended the rows to double distance, to make room for more horse hoeing, with very little deficiency in the crop; but, if the business be well conducted, this will rarely be necessary.

I thought it proper to name this system here, as having succeeded in the hands of a very respectable character, and engaged the attention of some ingenious agriculturists; but whether the practice is likely to spread or be more generally adopted I am not informed; nor am I convinced that it is better than an alternate system of grain and green crops, which furnishes the means of supporting a large live stock, and thus increasing the quantity of manure for forcing large crops of grain; Mr. Cotes has other means of doing this from a large live stock kept on grass land in his occupation.

Soiling, or supporting live stock in stalls, by green food.—If this practice were generally applied to all the heavy kinds of stock, it would greatly increase the national resources; it has before been observed that a horse may be well summered, with a good acre of vetches or lucern in this method; and a good crop of broad and red clover is equally productive, and equally applicable to the practice, but I believe not quite so staple an article of food. The late Joseph Wilkes, Esq. of Measham, Derbyshire, extended it to mowing grass with great advantage; he had the mown grass carried to the stalls, to his horses, and the horse manure carried back to the land immediately, so soon as the horse litter was wetted or moistened, without waiting for fermentation; and he assured me that the manure went farther, and made more improvement thus, than in any other way, and that it quickly disappeared, and got into the soil. He was of opinion that all farm-yard manure was wasted by much fermentation: "put it on the ground, and let the land and the muck settle it," that was his expression; and I have frequently remarked that the litter and dung arising from foddering cattle on grass land in winter, after dressing it slightly over, soon disappears in the spring. Mr. Wilkes was of opinion that if mown grass be carried to the stables, and the manure made from eating it were immediately returned to the land, such land would regularly and progressively

improve; and I suppose the same would hold good, to grass consumed in the same way by all sorts of cattle.

If this practice were general, to all kinds of heavy stock it would be the means of an immense saving in the extent of land necessary for their support; all working horses should be supplied through summer, with lucern, vetches, clover or mown grass carried to the stables, and the manure arising therefrom, should be immediately returned to the land, and in winter plenty of chaff and cut straw should be mixed with their corn: I believe that by a strict adherence to this economy, managed with judgment, an acre per head, upon all the horses kept in the kingdom, might be saved in their support.

Milking and dairy cows, might be supported in the same way by vetches or mown grass in summer, one acre per head; and by turnips, cabbages, carrots, potatoes, and Swedish turnips, till grass, or vetches came round; an acre per head from such crops, would be sufficient for winter keep; and two acres thus for the whole year round; the grass land for this purpose must be improved, to a state fit for mowing, in which state all permanent grass land ought to be, after proper winter, and spring saving; and the return of the manure from its own produce, will support it in that state, and even improve it.

If all the heavy cattle stock of the kingdom were kept upon this system, and green crops sufficient cultivated for their support, which might be occasionally assisted from grass land; it is probable that one million and a half of such stock now in being, might be maintained equally well as at present, upon

	Acres.
an acre per head less land, saving - - -	1,500,000
And one million of horses, upon the same system, on a saving of	1,000,000
Saving of land by confining heavy stock - -	2,500,000
And of the fallow ground of the kingdom, green crops upon -	500,000
Saving of land by this system, acres	3,000,000

And this of our most productive land. The produce of this thrown into the market, would supply a much greater demand than is likely to exist at present, or for many years to come. As this method of supporting heavy stock became general, a greater stock might be maintained, and yet a proportion of grass land cultivated for green crops and grain; and thus great addition made to the national resources for human subsistence.

Oxen instead of Horses.—Much has been said upon the national advantages to be derived from a change of this nature; but it has been shewn before in the chapter on horses, that as those used in agriculture are in a great measure a nursery for those wanted for other purposes; the extent of such change can take place no farther than about the work of 100,000 horses.

To ascertain what general effect such a change might produce in increasing food for mankind, as what I call the higher kept farm horses are generally, or at least a part of them, in preparation for sale, for the road or harness; I must suppose the deduction made, from what I have called moderately kept farm horses, now supported at $4\frac{1}{2}$ acres per head; then the deduction of 100,000 of those would save the landed produce of - - - - 450,000 acres.

And the reduction of young stock, in the same proportion, one-ninth of the whole, would save one-ninth of 250,000 acres, to preserve even numbers, suppose - - - 30,000

In all saved - 480,000 acres.

The idea in all the midland counties is, that two oxen will be required to do the work of each horse; 200,000 working oxen will therefore be wanted instead of the horses thus deducted. To give the oxen a fair chance in this calculation, I will suppose them fit to work at three years old, and the workers to be of the ages of three, four, five, and six, respectively, 50,000 each; the same number coming one, two, and three years old, will be wanted for succession stock, and 50,000 annually fatted off; the land necessary for their support may be nearly as follows:

	Acres.
Keep of 50,000 steers, of the ages of coming one, two, and three years old respectively, 150,000 in all, at one acre each per head per annum	150,000
200,000 working oxen, of full three, four, five, and six years old, 50,000 of each, at $2\frac{1}{2}$ acres per head per annum - - -	500,000
Less land cannot, I believe, be possibly allowed to keep them in working condition; they must have hay and sometimes corn when closely worked.	
50,000 fatting, at 3 acres per head - - - -	150,000
Land for the oxen necessary, acres - - - -	800,000
Deduct for the horses - - - - -	480,000
Difference - - - - - -	320,000

This 320,000 acres of land will produce 50,000 fat oxen, or 32 acres will produce 5 fat oxen: suppose them 270lb. per quarter each, or 5,400lbs. of beef from 32 acres; this is 168¾lbs. of beef per acre per annum; but a dairy will produce more, and a flock of sheep well managed quite as much human food, per acre. Little advantage, therefore, would be derived from this change of substituting oxen for horses in agriculture, unless the use of horses on the road, and for purposes of pleasure, luxury, pomp, amusement, trade, mining, manufactures, commerce, and war, could be abolished or lessened; an event which I suppose no friend to the prosperity of this country will wish to see brought about to any great extent; as it seems to be now generally understood that luxury, in a moderate degree, is a principal encouragement to commerce and manufactures, and consequently a powerful instrument of prosperity. Mr. Malthus says, "The advantages of luxury, when it falls short of actual vice, are certainly great:" it cannot be denied but it contributes to the comforts, enjoyments, and consequent happiness of a nation; but if carried too far, it will completely defeat its own purpose; the surest way is to stop short of the mark.

Culture of wheat and grazing compared.—As I consider the culture of wheat to be, upon the average, one of the least profitable branches of agriculture, and to shew that it is an object that requires public encouragement, I shall compare the profit or loss arising from it, with that from grazing, as follows:

	£.	s.	d.
An acre of good grass land is supposed capable of producing half a pound of beef or mutton per day for a year, and is equally productive in dairying; 182 lbs. of beef or mutton, at 6*d.* per lb. is per acre -	4	11	0
Deduct Rent and taxes £1. 10*s.* per acre - - -	2	0	0
Interest of capital - 10*s.* - - - -			
Profit per acre -	£.2	11	0

The offal, or fifth quarter, in fat cattle or sheep, will pay all expences of care, management, and repairing fences.

Cultivation of Wheat on Fallow Ground.

	£.	s.	d.
Rent and taxes for two years, 30*s.* per acre - - -	3	0	0
Four ploughings and harrowings, equal to one ploughing, at 10*s.* per acre each time - - - - - -	2	10	0
Manuring, as part is produced on the farm, but every plough farmer must buy a part, say only - - - - -	1	10	0
Sowing, weeding, and harvesting, per acre - - -	1	0	0
Threshing, marketing, and carrying out - - -	0	15	0
Interest of capital - - - - - -	0	5	0
	£9	0	0
Produce, 20 bushels per acre, over and above the seed, at 9*s.* -	9	0	0

Hence, for the farmer to be paid his expences, the average price must be 9*s.* per bushel, and to make it equal to grazing it must be 11*s.* 6*d.*; but the average price for forty years, ending 1800, was only 6*s.* 2*d.*; and even for five years, ending 1800, only 8*s.* 4*d.* although this latter period includes some of our dearest seasons. This state of facts will surely prove the necessity of encouraging the growth of wheat by all proper and possible methods.

The ploughing, at 10*s.* per acre, may be thought high, but I believe if a person were to keep a team either of horses or oxen for that purpose, with constant employment at that price, he would not very quickly grow rich: the other expences as charged are merely the price of labour; the interest of capital is charged double upon grass land, as it requires more capital than for tillage, to procure good live stock, which pays the best.

As a collateral proof that the result of this calculation is agreeable to existing facts and circumstances, it is well known that notwithstanding the occasional high prices of corn, grazing has, upon the average, paid much better; that the grazing or stock farmers are generally (I believe uniformly) in much the best circumstances; that their profits are not only greater, but their business is attended with much less care, labour, expence, and uncertainty; that they get rid of tithes; are less affected by the change of weather in this changeable climate; and, upon the whole, are in a more comfortable, a more plentiful, and a much better situation, in general, than the plough farmer.

As I suppose about one half of the wheat now grown in England may be upon land managed otherwise than in the wheat fallow system, and probably with equal produce, it may be but fair to calculate the expence of raising it upon this system; in which the clover-ley management, being the most general, may serve as an example for all the rest.

Expence per Acre of raising Wheat on Clover-ley Ground.

	£.	s.	d.
One ploughing, and harrowing, and dressing, equal to another ploughing, at 10*s.* per acre each	1	0	0
Rent and taxes for one year only	1	10	0
Manuring as before	1	10	0
Sowing, weeding, and harvesting	1	0	0
Threshing, marketing, and carrying out	0	15	0
Interest of capital	0	5	0
Per acre	£.6	0	0
Produce, 20 bushels per acre, over and above the seed, at 6*s.*	6	0	0

Upon this system 6*s.* per bushel affords no profit; and to make the profit equal to grazing, the price must be 8*s.* 6*d.* per bushel. If we take a medium between the two systems the price must be 7*s.* 6*d.* per bushel to pay expences only, and 10*s.* per bushel to give a profit equal to grazing; and as no consideration has in either case been made for tithes, unless the above quantity per acre can be raised over and above tithes, which is not supposed the case, one-ninth must be added on that account; this brings the average price, without profit, to 8*s.* 4*d.* per bushel; and with a profit equal to grazing, to 10*s.* 10*d.* per bushel.

Tithes.—The subject of tithes now comes naturally under consideration. I believe that at present this check upon agriculture, not only in itself raises the price of wheat near 1*s.* per bushel; but I have personally known so many instances of individuals narrowing their growth of corn, in consequence of the trouble, expence, and vexations, real or supposed, of tithes; that I am thoroughly convinced the quantity of corn grown is thereby diminished. If the payment for tithes were not subject to variation, but fixed at a certain sum in proportion to the rent of the land, whether the land were at grass or in tillage, this evil would be removed; and if the Board could bring about an equitable commutation of this nature,

they would render essential service equally to the farmer, the tithe owner, and the community.

Mr. Malthus, on this subject, observes, "a tax in proportion to gross produce, which in the case of capital laid out in improvement, is scarcely ever accompanied with a proportional increase of clear gain, must necessarily impede, in a great degree, the progress of cultivation. I am astonished that so obvious and easy a commutation for tithes as a land-tax on improved rents has not been adopted; such a tax would be paid by the same persons as before, only in a better form, and the change would not be felt, except in the advantage that would accrue to all the parties concerned, the landlord, the tenant, and the clergyman. Tithes undoubtedly operate as a high bounty on pasture, and a great discouragement to tillage, which, in the present peculiar circumstances of the country, is a very great disadvantage." Thus far Mr. Malthus.

Bounty on Exportation, Corn Laws, Distilleries.

Different opinions have prevailed upon the good or bad policy of a bounty on the exportation of corn when below a certain price; it has always been an unpopular measure among the lower classes, who conceive, that by sending abroad this article, they are deprived of the use of it, and the price raised at home, not considering that had not its growth been encouraged by the expectation of such exportation, the quantity so exported might never have existed. Dr. Smith, in his Wealth of Nations, disapproves of the bounty, yet admits that it had been attended with a good effect, and that a corn trade thus forced had been beneficial to the nation; this is a strong presumptive proof, that the measure was in itself wise and salutary. Mr. Malthus says, "it was certainly a bold assertion in Dr. Smith to say, that the fall in the price of corn must have happened in spite of the bounty, and could not possibly have happened in consequence of it." Dr. Smith's mistake seems to have been, in supposing the quantity grown not influenced or increased by the bounty, which, if the case, such bounty were certainly unnecessary. If corn grew spontaneously, or was sure to be grown in a given quantity, there would be no occasion to encourage its export by a bounty; but as the growth of corn is a business of labour, care, effort, energy, expence and capital, without certainty of profit, or ever of being repaid expences, it must certainly be good policy to encourage its growth, and without which, perhaps, a considerable surplus will seldom exist.

Corn Laws.—In 1688, the average price of wheat being then about 28*s.* per quarter, a bounty of 5*s.* per quarter was granted upon the exportation of corn, whenever the home price was less than 48*s.* per quarter; when above that price, exportation was suspended.

Yet the home price under this bounty was seldom so high as the export price; in consequence of this encouragement large quantities were grown, and the average price, according to Dr. Smith, was, for the first 12 years to 1703, 5*s.* 9½*d.* per bushel; from that time to 1764, it gradually lowered to 4*s.* 6*d.* 4*s.* 2*d.* and 3*s.* 9*d.* per bushel, which last was the average price for ten years preceding 1750, under a very great exportation; this was doubtless owing to the quantity raised, from the encouragement thus given: see Chap. I.

In 1773 a very unfortunate alteration took place, by lowering the export price to 44*s.* per quarter, although labour and expences were then rising, and no bounty allowed when above that price, although the growth then wanted encouragement; the growth has since been neglected, as not paying near so well as grazing; see the calculation: and these circumstances are a strong presumptive proof, that this neglect has been in consequence of the discouragement thrown in its way, at the very time when encouragement was wanting; enough has not since been raised for home consumption, and a regular and increasing import has taken place; the bounty price, instead of being lowered to 44*s.* should then have been raised to 52*s.* and I have no doubt but greater plenty and a reduced price would have followed, instead of scarcity and high prices.

In 1804, by Mr. Western's Act, England and Wales is divided into twelve maritime districts, and Scotland into four, and the import and export to be regulated by the aggregate average price of such districts, and wheat, when at or under 48*s.* per quarter, may be exported, with 5*s.* per quarter bounty, but if above 54*s.* no export allowed; this is placing the prices of 1804 upon the same footing with those of 1688, at least so far as that price is influenced by the bounty; but the distance of time and great alteration which has taken place in the value of money, makes this regulation almost appear a burlesque on the trade, instead of a serious encouragement to it. In these times, and under present circumstances, I am of opinion that the bounty on export should extend to 60*s.* per quarter, and the prohibition not take place at less than 72*s.*; and that these prices, instead of being high, are in the present state of things extremely moderate; and that a liberal mea-

sure of this nature, by encouraging growth and increasing quantity, is much likelier to lower prices and lessen import than a narrow confined system.

As bounties upon exportation at a liberal price, have proved themselves experimentally to be a good measure, they certainly ought to be continued, and the spirit of the law on that subject restored, which is not done by fixing the price as low as it was in 1688; no evil can possibly arise therefrom, because such exportation can be stopped instantly upon advance in price, their object being wholly to increase quantity by insuring a market. Mr. Malthus has, I think, successfully answered Dr. Smith's objections to such bounties, and sufficiently proved their good policy, good effect, and general utility: he further says, "If from the beginning every kind of trade had been left to find its own level, agriculture would probably never have wanted any particular support; but when once this general liberty has been infringed, it seems to be clearly our interest to attend principally to those parts of the political structure which appear to be the weakest, and upon this principle to promote and encourage cultivation in England."

Upon a similar principle, Mr. Malthus approves of the operation of the distilleries, as taking off a redundancy of grain in years of plenty, and thus encouraging its growth, and giving in such years a salutary check to the too great increase of population, which a cheapness of grain might occasion, by encouraging marriages among the lower classes; and as the grain can be withdrawn from this use in time of real scarcity, a public granary is thus opened, richer probably than could have been formed by any other means; a country without distilleries might be more populous, but on a failure of seasons would certainly have fewer resources than with them.

Storing Corn, public Granaries, &c.—Respecting keeping the produce of a plentiful year, for future supplies, this will only be done to a certain extent; the corn farmer can seldom afford to do it but in a small proportion; his circumstances will not admit it; he is seldom benefited by high prices, his quantity on those occasions being deficient; a year's consumption of old corn will seldom or never be in the hands of the farmers upon the return of harvest, and perhaps not often half a year's; if low prices occur after harvest, the farmer generally lessens his sowing of wheat.

Public granaries, or store-houses of corn, laid in or stored in plentiful seasons, and supported by the interference of Government, seem to be reckoned inconsistent with the police, or political economy of this country; although we have such

notable example in the sacred history of ancient Egypt; and the same, or a similar practice, is said to exist under the direction of the Mandarins in China. The farmers' stack yard is supposed the best public granary of England, though these, in case of an advance in price, have generally been looked upon with an evil eye by the populace.

Notwithstanding this, in some future state of increased population, it may, perhaps, be found expedient for Government to turn its attention to some measure of this nature, and as we seem to be on the road to this state of society, it may not be improper to bestow a few thoughts, by way of hint, towards some such measure. Suppose then, that in each one of the 16 corn districts of Mr. Western's Act, a public granary were erected, adjoining water carriage for storing bread corn only, to an amount not exceeding one quarter of a year's consumption of the district, to be laid in when corn was within the bounty on export price, and sold out when it exceeded the prohibition price; the time of laying in to be from Lady-day to Michaelmas, at which time corn becomes seasoned and fit for keeping, and to be sold out according to circumstances, when likely to afford the most relief; the respective districts might be under the inspection of the county magistrates, or quarter sessions, and the general management vested in the Board of Agriculture, whose officers might have increased salaries, or increased numbers, for such increase of business; but this is only given as a hint for future consideration.

Leases.—An intelligent agricultural friend of mine is of opinion, that if landlords would more generally grant fair and liberal leases, it would promote improvements, occasion a more abundant produce, and be a means of preventing scarcity: to secure the landlord's interest a lease for twenty-one years may be upon the principle of advancing the rent upon the expiration of each seven years, by a certain proportion agreed upon: and, as a similar security to the tenant, if at the end of the term they should not agree, the tenant should have a right to be paid for all improvements he left behind him, by the award of two indifferent persons; the tenant to be allowed to take fallow crops, as cabbages or potatoes; and to be compelled to lay down clean to grass, after so many years in tillage.

He is of opinion that one half, at least, of the wheat fallow ground might be planted with potatoes; and if the other half were completely fallowed alternately, the whole would come under this method of cleaning in rotation; but this is unnecessary, it can be kept perfectly clean by other means and under crops.

CHAPTER VII.

Increased Capitals may be employed in Agriculture; Vegetable Diet; Fisheries; Beverage from Fruit.

If trade, manufactures, and commerce had met with no greater encouragement and been supported by no greater attention and capital, than practical agriculture, this country would never have attained its present height of commercial prosperity; and perhaps it is in some degree to be lamented that these, from affording a greater prospect of gain, have been supported, and flourished at the expence of that attention and capital which ought, in part, to have been applied to agriculture: at present it is very certain there is not sufficient capital employed in the latter, and that it will be found necessary to extend and increase that capital, in order to produce subsistence for an increased population.

At present, too, the preference so generally given by men of property and capital to grass land, to the neglect of corn culture, and the leaving of the latter generally in the hands of people of the smallest capital, and who have the least means of improvement, is one cause of an occasional scarcity of corn.

Mr. Malthus says, "if a populous country direct its industry and capital to agriculture, it may have a surplus of corn, but not otherwise;" and again, "if every inch of land in this country were well cultivated, there would be no reason to expect, merely on that account, that we should have a surplus of corn; that would depend entirely on the commercial population, and on the direction of capital to agriculture, or to commerce."

As the great and leading feature of improvement upon an estate, such as draining, watering, &c. can be often much better done upon a general system, and without regarding particular occupations; these should be set on foot by the landlord, who might charge interest for his expenditure, in proportion to the benefit each one received. The bringing up a main drain from the lowest level, and complete drainage into it; the collecting waters at the head of a stream in any particular estate for irrigation; and drawing floating water courses along the highest practicable level, are of this nature. If gentlemen of large landed property would employ proper persons and take necessary measures for the general improvement of their estates, it

would be equally laudable and agreeable, and I believe in general much more profitable, than the improvement of their mansions and demesnes, and tend greatly to the advantage of the community. All grass land ought to be improved to a state fit for mowing, either for hay or to carry as green food to live stock in stalls, and should be either improved to this state, or cultivated for corn; and if larger capitals were employed in cultivation, the business might be rendered more regular and systematic, and grain most probably cheaper grown.

As a country will support a much greater population upon a vegetable diet than upon animal food, that regimen should be promoted; but as little can be done by authority in this way generally, I think it ought to be a regulation in all congregated bodies maintained by charity or the public, that they live two days in every week principally on soups, puddings, or preparations of milk, potatoes, and vegetables, or with but a small allowance of animal food; with the same view fisheries should have all due encouragement; I have often thought Lent, and the fasts of the church, were wise political regulations, and lament their abolition or neglect; when the consciences of mankind were biassed by religious institutions to a regimen favourable to health and plenty, such bias should have been supported, if not from religious, yet from political motives.

If the quantity of beverage from fruit could be increased, so as to lessen the consumption of malt liquor, it would increase the resources for human sustenance. To shew the extravagant tendency of barley for beverage, I shall just state that I know individuals who would easily consume annually the malt liquor made from two acres of barley; and that many individuals do actually consume between one and two acres. The annual consumption of barley ground in beverage has been before stated at about a million and a half of acres; if this could be considerably lessened, by the introduction of beverage from fruit, though it might lessen the revenue, it would certainly increase the means of human subsistence.

The production of fruit interferes but little with that of either corn or grass, I therefore consider the extension of the growth of this article, so as to lessen that of barley, as a national object.

CHAPTER VIII.

Gardens, Potatoe and Cow Ground for Labourers; Produce, and probable Effect, of such Improvement in our Rural Economy.

THAT every labourer who marries, keeps house, and has a family, should have a garden, sufficient to supply potatoes and other vegetables for such family, every one I suppose will admit; but many friends to humanity and the comforts of the poor have supposed, that the addition of potatoe ground to keep a hog, and grow some wheat, would greatly improve their situation, and that the addition of cow ground would futher ameliorate their circumstances, and improve the condition of the labourer; but the utility and expediency of this, has been controverted by others.

Respecting this question I am of opinion, that if a small portion of land in the hands of a labourer can be made equally, or more productive than in the hands of a farmer, and that without depriving society of any part of the industry of such labourer, his possessing it must add to the comfort and happiness of his family without injury to any one; and consequently is an addition to the comfort and happiness of society. An objection has been made that by having small concerns of his own he will be apt to loiter his time, and neglect the employment of others, to his own loss, and that of the community; but if extra encouragement of this kind were given in emulation only to the more steady and industrious labourer, this would not happen, and his family might be benefited, without the community receiving any injury.

In the Annals of Agriculture, No. 256, is an account by the late Sir William Pulteney of an occupation by a Shropshire cottager, Richard Milward, who with a wife and six children occupied 1 acre 10 perches of land, upon which, principally by the labour of his wife, the man being employed elsewhere, was raised annually 15 statute bushels of wheat, and 140 bushels of potatoes, of 80 lb. to the bushel, over and above the seed, and from which was supported and fatted a hog of 300 lbs. weight; in this case the odd 10 perch was cultivated for garden vegetables, and the acre in two divisions, wheat and potatoes alternately, half an acre each; the manure raised from the hog by means of the wheat straw, and potatoe haulm, being sufficient to support the crops.

The wheat was sown by the woman upon the following plan; in autumn, when the potatoes were fit to get up, she daily in the morning marked out the work of one day, upon the potatoe ground, from which she first cleared off the potatoe tops and haulm, this served to litter the pig and make manure, she then sowed that spot with wheat, and proceeding to get up the potatoes; the seed wheat was properly covered by that operation, and the wheat crop succeeded equally well or better thus than in any other way; they had formerly had it sown by the neighbouring farmers, but being frequently disappointed, had adopted this method, which had completely succeeded; and as the proper time of sowing wheat agrees exactly with that of getting up potatoes, namely the whole month of October, or any time then about the two operations are well combined in one; in this system an acre of land produces annually 15 bushel of wheat of 60 lb. each, 900 lbs. consequently

of bread - - - - - - -	900 lbs.
And potatoes 140 bushel besides seed for next year, at 80 lb. to the bushel - - - - -	11,200

This produce of wheat is more than the average, but may be obtained upon land well managed and kept clean from weeds, which in this case might be done by the wife and children; a clean crop of potatoes, is one of the best preparations for wheat.

An hog at one year old may grow to the weight of 300 lbs. and be supported to that weight from the above produce, and to spare: suppose his average allowance the first three quarters of a year to be one peck of potatoes per day, besides refuse of wash and garden vegetables.

Suppose 270 days at 20 lb. per day of potatoes	-	5400 lbs.
90 days when fatting at 40 lb. per day	-	3600
		9000

During the time of fatting, the potatoes should be boiled and mashed with the bran of the wheat reserved for that purpose, and 2200 lb. weight of the potatoes remain for the family use, and from this instance some data may be collected for estimating the quantity of land necessary for supporting mankind by the cultivation of wheat, potatoes, and hogs; if 9,000 lb. weight of potatoes, give 300 lb. weight of pork or bacon, then 30 lb. of potatoes will give 1 lb. of pork or bacon, and an acres of potatoes of 280 bushels more than the seed, 80 lb. to the bushel, which is

about the usual crop under good management, would produce, if wholly applied to that purpose, 746 lb. of pork or bacon, which is more than 2 lb. per day for a whole year, and a good supply for four persons; also if 30 lb. of potatoes give one pound of pork, worth upon the average 6*d.* then a bushel of 80 lb. is worth 1*s.* 4*d.* applied to this purpose; also farther, an acre of potatoes will supply 730 lb. of pork or bacon, which is half a pound each per day for four persons for a year, and leave 500 lb. weight of potatoes to spare, which with vegetables from the garden, would be sufficient vegetable food for four persons through the year.

The principal, and heaviest labour in the above culture, would be the digging for and setting the potatoes; if done by hand work, this upon the half acre would take a man a fortnight; all the other labour might be done by the man at odd times, or by his wife and children.

Cow ground has also been proposed for labourers: this I think should be confined to the more steady and deserving; and as cultivated crops would interfere too much with the man's time, should be confined to grass land only; two acres of good grass land, or a flat of about 100 yards square, with a small hovel, or cow shed in the middle, would support a cow; the grass should be mown, and carried to the shed on a wheelbarrow or in baskets, and the manure made by the cow returned to the land, no part of which would, upon this plan, lay much more than fifty yard[3] from the shed. The man might mow a short swath in the morning, and the land round the shed be applied to summer keep, and that more distant reserved for hay; the cow would be fed and managed by the wife and children, and might be asisted occasionally by potatoes.

Single cows kept in this way would not, I believe, answer to make cheese, but would produce butter in the same proportion as more together: and would supply milk to the neighbouring poor much more regularly than they are now supplied, as farmers who make cheese do not care to lessen their quantity of milk, and therefore dispose of none by sale.

I do not propose this system upon the principle of giving labourers a right to demand land and cows, as this might give a kind of premature independance; take them off from labouring for others, and thus encourage idleness, and consequent poverty; the execution of such plan must be left to the benevolence of the land proprietor, who by adopting it and preferring the most deserving, might hold

out a stimulus to industry and good conduct, and ameliorate the condition of the industrious labourer, without any loss or expence to himself or the community.

Mr. Malthus, who has raised some strong objections to the compulsory plan, or right of demanding land and cows; as well as to that of lessening the general consumption of wheat, by substituting milk and potatoes as the regular food, admits, "that were it so ordered as to provide a comfortable situation, for the better and more industrious class of labourers; and to supply at the same time a very important want amongst the poor in general, that of milk for their children, I think that would be extremely beneficial, and might be made a powerful incitement to habits of industry, economy, and prudence; with this view however it is evident that only a certain portion of the labourers in each parish could be embraced in the plan, that good conduct, and not mere distress, should have the most valid claim to preference, that too much attention should not be paid to number of children, and that universally those who had saved money enough for the purchase of a cow should be preferred to those who required to be furnished with one by the parish.' And further, "most of those labourers who keep cows at present, have purchased them with the fruits of their own industry; it is more likely that industry should give them a cow, than that a cow should give them industry."

Agreeable to these ideas, as well as to my own, I would propose a plan for the encouragement and amelioration of the condition of labourers, which, could it be executed, would, I believe, increase their comforts and resources, and in some degree those of the community, and have some weight in counteracting the effects of a season of scarcity.

The number of labourers' families in the kingdom employed and supported by agriculture, may be difficult to ascertain with any certainty; in the Annals of Agriculture, the Editor has estimated that England and Wales may contain 500,000 such families, which I think a good deal above the real number. If we suppose one such family to every 50 acres in tillage, and another to every 100 acres at grass; this would give 340,000 families for England only: to preserve numbers of easy calculation, I will suppose 360,000 such families; for the accomodation of these, I would have 3 classes of occupations, class 1, and lowest, a cottage and garden of a quarter of an acre for potatoes and other vegetables, 120,000 families; this compass of land any labourer of the least industry might,

with the assistance of his family, cultivate properly by little efforts night and morning, without interfering with his daily labour, and the refuse of vegetables not consumed by the family may go towards the support of a hog; most labourers have something like this accomodation at present, except that they are often confined in compass of land.

Class 2. In addition to a garden, the potatoe and wheat ground, as described by Sir William Pulteney, for half an acre of these crops alternately; in this case the garden may be lessened to one-eighth of an acre, as no potatoe ground is wanted there; the occupation will be an acre and one-eighth, the probable produce, as proved experimentally, has been stated before.

Class 3. The tenement and garden, one-eighth of an acre, potatoe and wheat ground one acre, with two acres of grass land in addition for keeping a cow, a small cow shed near the centre of such grass land; the cow to be supplied with mown grass in summer, and hay in winter, with occasional assistance from potatoes, or garden vegetables; these two last classes respectively would require about a fortnight of the labourer's sole attention throughout the whole year, for the setting of his potatoes; the other business might and ought to be done at odd times, or with the assistance of the wife and family.

To estimate the general effects of such a system it must be calculated in the aggregate, or by the extent of land it would occupy, as follows:

	Acres.
Class 1, or lowest, 120,000 garden occupations, at one quarter of an acre each - - - - -	30,000
And the rent of the tenement and garden £2. 10*s*.	
Class 2. 120,000 occupations containing each a tenement and garden one-eigth of an acre; with potatoe and wheat ground one acre each; in all 1 acre 20 perches - - - -	135,000
Rent £4.	
Class 3. 120,000 occupations, with tenement and garden as before one-eighth of an acre, potatoe and wheat ground one acre; and two acres of grass land in addition for keeping a cow; in all, 3 acres 20 perches each	375,000
Rent of the latter £7. average rents £4. 10*s*. each.	
360,000 families upon Acres	540.000

Or 1 acre $\frac{1}{2}$, to each family on the average, the labour for cultivation necessary, besides what is done by the wife and family, suppose one fortnight in the year as an average for all the 3 classes; if we suppose 3 children reared by each family, this, with the man and his wife, will be 1,800,000 inhabitants, occupying 540,000 acres.

The average rents as above, make nearly 50*s.* per annum for the tenement, and 30*s.* per acre per annum for the land, being 360,000 occupations at £4. 10*s.*—1,620,000; this would pay the land proprietor as well as land let to the farmer.

Mr. Malthus has observed, "if the numbers in the lower classes were diminished, and that in the middle classes increased, the sum of human happiness would be augmented:" this plan, it is believed, would have a tendency to that effect.

The product would be, from classes 2 and 3, 120,000 acres of wheat; in the instance given above, wheat is rated at 30 bushel per acre, in this mode of culture; but not to over rate it I will suppose 25 bushel per acre increase, or bread from an acre for 5 persons; then 120,000 acres of wheat will supply bread for 600,000 persons.

120,000 acres of potatoes, in classes 2 and 3 will supply pork, bacon, and potatoes at 4 from an acre for - -	480,000
120,000 fatted calves from class 3, together with the pork supplied from the cows, and from class 1, will produce animal food equal to the supply of - - -	120,000
Making up animal food also for	600,000

In Chapter III. article Cows, it is estimated that 8 cows will supply 50 persons with cheese, milk, and butter; the 120,000 cows in class 3, will therefore be equal to a supply of those articles for - - - - - 750,000

Hence it appears that these occupations of 540,000 acres would supply the whole subsistence for 600,000 persons, besides milk, &c. for 150,000 more; or more than one third of the full subsistence for 360,000 families of 5 persons each; and this subsistence being gained by so small a proportion of their labour, would be a great resource in keeping them off the parish, even in times of scarcity, and more particularly as having substitutes for bread in plenty amongst themselves.

In the article of beverage, labourers in husbandry are very generally found in beverage by their employers; but it would be a still farther improvement upon this

plan, if fruit trees were grown upon these small occupations sufficient to supply fruit liquor for their consumption, as interfering little with the other products of the land.

If some such plan were brought about, by the active benevolence of those in higher or middle life, I cannot doubt but that the condition of the labourer would be ameliorated, and society in general would feel the advantage of such encouragement given to them. Mr. Malthus observes, "what promotes habits of industry, prudence, foresight, virtue and cleanliness amongst the poor, is beneficial to them and to the country, and vice versa."

CHAPTER IX.

Probable Population upon an Improved and extended Cultivation; productive agricultural Systems proposed.

As the average produce of our wheat lands are at present, notwithstanding fallows, certainly too low, I can make no doubt but that with the increase of green crops, live stock and manure, their produce may certainly be increased, and it will not be unreasonable to suppose that this may soon be brought to 25 bushels per acre; over and above the seed, which would supply bread from an acre for 5 persons instead of 4, as at present.

Barley for beverage, I will suppose as at present, 4 bushels per annum to each individual, and 4 quarters per acre produce, then each acre will upon the average supply eight persons.

Potatoes and wheat alternately; as potatoes will afford more animal food per acre in pork or bacon, than can be obtained from grass land, or in any other method now in practice; this system should be extended; an acre of potatoes will supply animal food for a year to four persons, besides an overplus to be eaten as vegetable food.

As all our permanent grass land ought to be improved to a state or staple capable of producing at least a ton of hay per acre (which indeed is no great produce, as two tons per acre is I believe common, and three tons per acre talked off, from good meadows) where grass land cannot be brought to produce at least one ton, it ought to be brought into cultivation for corn. We may reckon an

acre of such grass land to produce in grazing, a sufficient quantity of beef, or mutton to serve an individual through the year.

And if dairy cows were housed and fed with mown grass or vetches in summer, and with green cultivated crops, and a little hay in winter, two acres per head would maintain them through the year, and 20 cows from 40 acres would supply cheese, butter, and milk for 125 persons, or $3\frac{1}{8}$ from an acre, also would additionally supply from fatted calves and pork produced from the dairy, sufficient animal food for 16 persons, from 20 cows, for the whole year.

Garden vegetables, a quarter of an acre to a family of 5 persons, or an acre to every 20 persons, is fully sufficient for this purpose, potatoes included.

From this data may be calculated the quantity of land necessary to support any given population, under the proposed improved cultivation, and according to the present modes of living; and if all horses were kept in the stable constantly, and fed with mown grass, clover, vetches, or lucern in summer, and with plenty of cut straw or chaff to their corn in winter, with a more general growth of carrots as their occasional food, and to save hay and corn, I believe there is no doubt but that an acre per head might be saved in their keep, and that 4 acres per head upon the average might be fully sufficient for their annual subsistence.

I shall therefore proceed to calculate as above for the support of 120 persons, which by proportion may be applied to any other number, or the kingdom in general.

Acres.		Persons.
24	for wheat, an acre supplying 5, finds bread for - -	120
3	Wheat fallow, supposed reduced to one-eighth of the growth of wheat, instead of near one half as at present	
15	Barley for beverage for - - - -	120
6	Potatoes and wheat alternately, or one-fourth of the wheat grown on this system would also supply food for - -	24 persons
40	To support 20 dairy cows, who will supply cheese, milk, and butter as above for 125; but to preserve even numbers, suppose only - - - -	120
	And over the above, will supply veal from fatted calves, and pork from dairy produce equal to a year's supply of animal food for - - -	16
88	carried forward	40

Acres.		
88	Brought forward animal food for	40 persons.
40	Of sheep land to supply animal food for - -	40
40	For feeding cattle to supply beef, &c. for - -	40
	Making a supply of animal food for	120 persons.
10	For succession stock to keep up the dairy.	
6	To supply garden vegetables of all kinds, or a quarter of an acre to every family of 5 persons.	
184	To supply bread, beverage, animal food, and vegetables, or the whole subsistence of 120 persons.	
32	To support 8 horses; 6 for constant farming work, 1 young horse for succession, and one hackney, to be kept in the stable on the food mentioned above.	
216	For the support of 120 persons and 8 horses.	

In this proportion 8,000,000 of people, with the requisite horses, will require 14,400,000 acres of land; but the kingdom, with its practicable waste lands, contains 30,000,000 of acres: there is therefore room, under the above proposed system of cultivation, to maintain a population of 16,000,000 and two-thirds of a million of people, or about double the present number of inhabitants; and this, under prosperous circumstances, would be brought about within the course of the present century.

And if Scotland and Wales are capable of improvement in the same proportion, which, from their much greater proportional extent of waste land, I believe they are, as they at present contain a population exceeding one-fourth of that of England, they would, in the same course of time, and under similar circumstances, increase to 4,000,000 and one-third of a million; and the island might then contain and support 21,000,000 of people.

In a general practice of agriculture upon such system, a much greater number of persons, in proportion to the acres, must be employed than at present. There is reason to believe that in the present practice a sufficient number of people are not employed, and that many more might be employed to advantage.

To illustrate the practicability of the proposed system, and to shew the number of persons necessary, in proportion to the whole population, to cultivate the land, I will put the case of a farm sufficient to subsist 120 persons, which, by the above

calculation, would consist of 216 acres, and state a course of crops and management for the whole.

Acres.

75 Of the lightest land, in 5 lots of 15 acres each, and the course, 1. wheat; 2. cabbages and Swedish turnips, for carting off; 3. common turnips, to be eaten on the ground by sheep; 4. barley, with clover seed sown. If the clover should be, in whole or in part, unpromising, such whole or part to be ploughed up immediately after harvest, and sown with winter vetches, for carting off to the stables, or tying stock, or both, as may suit the land.

The common turnips to be eaten off in time, so as to allow two ploughings for the barley crop; the cabbages and Swedish turnips may continue longer; it will be sufficient if they are cleared off by the end of the spring seed time, when the working of the ground for turnips must commence, and clover, vetches, or grass will be ready for the support of live stock in succession.

The manuring will be with farm-yard dung for the cabbages, &c. and if any other manure is applied in the course it should be extraneous, as lime for the turnips or barley, soot or other top-dressings for the wheat or clover, according to circumstances.

54 Of stronger land, in 6 lots of 9 acres each; the course, 1. a fallow crop manured, as potatoes; or, if suitable, carrots, or other vegetables that can be cleared off at Michaelmas; or, if judged necessary, a portion not exceeding one third of the whole may be left each round of tillage as proof spots, and for experiment as a complete fallow; this, by varying each spot alternately, each round might be so ordered as to give a complete fallow to the whole in three rounds of tillage, or once in 18 years; but this may be done, or not, at pleasure.

The second year of the course will be wheat; the third I suppose beans or pease, set or sown in rows and well hoed; the fourth cabbages, manured for; the fifth oats or barley, and the sixth clover; or if that fails, which may be seen in due time, the stubble to be ploughed up and sown with winter vetches.

7 For buildings, garden, yards, orchards, small grass paddocks near home, and for miscellaneous and experimental purposes. The seeds of common and Swedish turnips, and cabbages, should be saved by the judicious farmer,

136 Carried forward.

Acres.

136 Brought forward.

from selected plants, which will by degrees improve the species; a small close of lucerne should be grown, and the varieties of hardy and productive winter greens, of the cole kind, should be tried, (as well as carrots, if the ground be suitable), and according to merit, be introduced into the field culture, as well as turnip and cabbage crops.

80 Of permanent grass land. The situation of this will of course be determined by local circumstances; wherever water can be brought, the forming of meadows should not be neglected; the local situation of hay ground is not very material, as hay is easily moveable to a distance: good grass land may often be formed upon soils less proper for tillage, as perpetual improvements may be made upon it without end by draining, top-dressing, and watering. Where local circumstances will admit, a tract of good grass land round the cow-sheds and stables would be in addition to vetches, cabbages, &c. for feeding housed stock.

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216 acres, occupied as follows:

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24 Wheat,
24 Barley, or part oats,
9 Beans or pease,
9 Potatoes and fallow,
15 Turnips,
24 Cabbages, and Swedish turnips,
24 Clover or vetches,
80 Permanent grass land,
7 Buildings, garden, and miscellaneous.

As the breadth of permanent grass land is here considerable, it is evident that a portion of that may, if thought more adviseable, be brought into tillage, and included in the course of crops; in which case the tillage land may lay more than one year at grass; but this may depend upon local situation, the nature of the soil, and the judgment and discretion of the owner and occupier.

As a farm thus managed would have great resources for supporting a large live stock, I believe the tillage manure, as above proposed, would be furnished by the farm-yard. The land to be so manured is 15 acres for Swedish turnips and

cabbages; 9 acres for fallow and potatoes; and 9 acres more in that lot for cabbages; in all 33 acres: the common turnips for barley, will be folded by sheep, or may be assisted by lime, or other foreign aids, as before named, as well as the wheat at times; and it behoves the farmer to take every opportunity of procuring what manures he conveniently can.

The strength of men and horses necessary on such a farm may be next estimated. I believe six good horses will do all the tillage labour; a hackney may be added, who, when not wanted for that use, may draw a light cart with green or other food to the stalls; a colt or young horse coming in annually, or two occasionally, may be either bred or bought, and would enable the farmer, if no accident occurs, to sell one at times. I shall not reckon, upon the average, more than eight horses in the whole necessary.

If no oxen are kept, which are much less profitable than heifers, I highly approve of Mr. Bakewell's plan of drawing heifers in light work; they are equally tractable and docile with oxen, and may be drawn from two years old to the Christmas following, when, if in calf, they should be left off working. As a farm upon this scale, and under this cultivation, might support twenty dairy cows, suppose six calves reared annually: these might graze at large the first year, and to the second autumn, when they should be taken into the sheds and domesticated, used to the collar and harness, and put to work with those a year older, in light carts, to supply food for the housed stock. This is not mere theory, having been reduced to regular practice at Dishley, and might with great advantage be rendered general.

As I would propose all the carting of green and other food for stock, except hay harvest, to be done by this species of cattle, so as not to interrupt or hinder the horses in the heavier work of cultivation and manuring the land, if the heifer stock should be thought insufficient for this purpose, the bull might be trained to drawing, or a steer may be reared now and then, and introduced for this purpose.

The number of persons necessary to do the business of such a farm might be three in the stables, to take care of and work the horses, a man, a strong boy, and a lesser boy; also a cow-herd man servant; these four might be servants in the house, with three women servants; and suppose the farmer, his wife, and three children, this would make a family of twelve in the house.

The cow-keeper must have a helper, to assist in cutting, carting, and conveying green and other food; there must also be a shepherd, and occasional assistant for

the same purpose; these three may be labourers: also three other labourers, for threshing, fencing, draining, planting cabbages, and various kinds of improvements and other work; this makes six labourers, or about double the number now generally employed upon the same breadth of land, and upon the present system of practice. If we suppose each labourer upon the average to have a wife and three children, this makes 30 persons in addition to the farmer's family of 12; total 42. And by making allowance for harvest-men, wheelwright, blacksmith, collar-maker, and other employments dependant on agriculture, we may suppose one person to four acres employed or supported by agriculture, nearly equal to the present whole population; and, by their labour, an equal or greater number over and above themselves may be supplied with subsistence, and employed in trade, manufactures, and commerce.

Considering the present population of England alone as -	8,000,000
The agricultural population is, as stated before, - -	3,680,000
And the commercial population - - -	4,320,000

And considering the present state of the country respecting waste lands, imperfect culture and management, want of capital, energy, and numbers employed, I think there can be no doubt but that a double number, properly employed upon the above proposed system, which I suppose to be that of our best present agriculture, would support a double commercial population, with more regularity and certainty, than our present population is supplied; as all things become more regular and permanent, the nearer they approach to regular system.

And I suppose that by a still more operose system of hand cultivation, by increasing canal navigations and machinery, by a more general growth and use of fruit liquor, and thus rendering horse labour, in land carriage, in the cultivation of barley and in commercial affairs less necessary, and their species less numerous; by introducing potatoes, or preparations from them, more generally into the diet of the more numerous classes, and thus lessening the individual consumption of wheat, by increasing vegetable diet; extending fisheries, and lessening the individual consumption of butcher's meat; by a greater produce per acre of wheat, in consequence of such more attentive culture; by the introduction of new dietetic vegetables; and by a combination of these and other means, that a still farther very great increase, perhaps another doubling of the population of the island, may be gradually admitted, and equally well supported.

CHAPTER X.

A full Community, how far desirable; Instruction for the lower Classes proposed.

But as every earthly effort and production has its limit, a period must at length arrive when the produce and, consequently, the population of a particular district, or country, can, as depending upon itself, go no further, and of course the numbers that the whole earth is capable of supporting, has its bounds. Dr. Darwin, in Zoonomia, Part II. page 670, has expressed an idea, that "by the future improvements of human reason, such governments may possibly hereafter be established, as may an hundredfold increase the numbers of mankind, and a thousand times their happiness." This idea is, I fear, visionary, and a part of the mistaken system of human perfectability, inconsistent with the condition of human society, and the world it is placed in.

A great population is only desirable so far as the energies and industry of its particular and individual members may be wanted, or can be employed for the general good, and to promote the general happiness. Mr. Malthus says, "national prosperity and an improved agriculture are the causes, and not the effects, of an increased population; and as the population of a country may be doubled in less time than is required to double its produce of human food, the population of a country has always a strong tendency to outrun its means of subsistence, which it will inevitably do if not powerfully restrained by moral or physical causes, in which case it must unavoidably meet those dreadful physical checks God and nature have appointed—famine and its consequences. All that government or industry can do is, to make the necessary checks to population operate more equably, and so as to produce the least evil; to remove them, is in the nature of things impossible."

And farther, "the checks to population are moral restraint, vice, and misery. No act of government, emigration, benevolence, or industry, can prevent the action of these checks, in some form or other; they must be submitted to as the inevitable law of nature: the only enquiry that remains is, how they may operate with the least possible prejudice to the virtue and happiness of society. And if from the laws of nature we can go but a certain length in proportioning the food to the population, we must then try to proportion the population to the food; and with this view the necessary duty of moral restraint must be impressed on mankind."

Whether a full community, or population nearly equal to the average possible produce of the whole territory, is or may be a desirable object, either in a moral or political view, seems problematical, and of somewhat difficult solution. The example of China, where population is supposed to have been long stationary, presents no very agreeable picture of this state of society; scarcities and famines the most dreadful are there described, as matters of course, succeeding an unkindly season, or deficiency of crop. The exposure of infants to perish, and death of multitudes for want of food at such crisises, are the means taken by nature to thin the redundancy of mankind, and bring the demand for food within the means of supply; and these occurrences are there said to be not unfrequent.

That the superior energies of European intellect and exertion might provide better against the effects of such events may be supposed, but there is a point of contact between produce and consumption, supply and demand, beyond which no human conduct or management could prevent the devastations of want and misery, and which can only be prevented by foresight and prudence, both in the body politic and the individual; whose duty should be strongly impressed to practise that moral restraint which shall prevent his being accessary to bringing beings into the world without previously considering his means to maintain and support them, and their own probable means of obtaining future subsistence. There is no doubt but this moral restraint has now great influence in preventing an overflowing redundancy of the human species; and will continue and increase with circumstances, so long as caution and prudence exist amongst mankind.

Mr. Malthus has enumerated, amongst other checks to population in England, amongst persons of limited income,

The unpleasant "idea of being obliged to retrench former enjoyments, in consequence of an increased family."

Clerks who have a limited income, fear increased expences.

Sons of farmers and tradesmen, induced not to marry till they are settled in some business or farm.

The labourer is deterred from marriage by the fear of want and misery.

Servants in rich families, by the plenty they live in, and dread of being unable to maintain a family.

The annual marriages in England and Wales are, to the whole population, as 1 to $123\frac{1}{5}$.

Mr. Malthus proposes also a better education for the lower classes, and quotes the example of Scotland for its good effects. Education appears to have a considerable effect in the prevention of crimes; and habits of prudence founded on instruction, are extremely favourable to happiness.

He further says, on this subject, " I should be disposed to lay considerable stress on the frequent explanation of the real state of the lower classes of society, and their dependence on themselves for the chief part of their happiness or misery;" also, " that class of the people who have no resource but their own industry, should be taught the nature of their situation, and the real truth, which is, that without an increase of their own industry and prudence, no government can essentially better their condition; and that if the supply of labour be greater than the demand, and the demand for food greater than the supply, they might suffer the utmost severity of want under the most perfect government that the human imagination can conceive; that the mode of permanently bettering their condition must be by improving their morals, and teaching them to save for the contingencies of the married state, or expect to suffer the natural evils of a contrary conduct."

Dr. Adam Smith observes, on this subject, " The education of the common people requires, perhaps, in a civilized and commercial society, more of the public attention than that of people of rank and fortune." He proposes in every parish or district a little school, where children may be taught for a reward so moderate that even a common labourer might afford to pay it, the master being partly but not wholly paid by the public; he recommends, in addition to reading, writing, and arithmetic, the elementary parts of geometry and mechanics being taught, instead of a smattering of Latin, as applying to almost every common trade or profession; and the encouragement of the acquisition of these most essential parts of education, by giving small premiums and little badges of distinction to the children of the common people who excel in them.

The public can impose on all the necessity of acquiring the most essential parts of education, by obliging every man to undergo an examination, or probation, before he can obtain the freedom in any corporation, or be allowed to set up any trade, either in a village or elsewhere.

And further, though the state was to derive no advantage from the instruction of the inferior ranks of people, still they should not be altogether uninstructed; the state, however, derives great advantage from their instruction; they are less liable

to the delusions of enthusiasm and superstition, which, amongst ignorant nations, frequently occasion the most dreadful disorders: an instructed and intelligent people are always more decent and orderly than an ignorant and stupid one.

The arguments which have been urged against instructing the people are not only illiberal, but, to the last degree feeble; the principal argument that I have heard is, that they would be put in a capacity of reading such works as those of Paine, and that the consequences would be opposition to government; but on this subject Mr. Malthus agrees with Dr. Smith, that an instructed and well-informed people would be much less likely to be led away by inflammatory writings, and much better able to detect false declamation, than an ignorant people: the quiet and peaceable habits of the instructed Scotch peasant, compared with the turbulent disposition of the ignorant Irishman, ought not to be without effect upon every impartial reasoner.

Nothing has been done by the public, in modern times, for the instruction of the lower classes, except the establishment of Sunday schools; which are, I believe, very good institutions as far as they go; but these being chiefly confined to towns and supported by subscriptions from individuals, they of course can give to the instructions there given any kind of bias they please; and even these, imperfect as they are, are of very late date: it therefore seems very much a national object, that parochial schools, upon the plan of Dr. Smith, or somewhat similar, should be established and supported by the public.

Mr. Malthus observes, "we have lavished immense sums on the poor, which we have reason to fear has been little to their real advantage; but in their education, and in the circulation of those important political truths that most nearly concern them, and which are perhaps the only means in our power of really raising their condition, and of making them happier men and better subjects, we have been miserably deficient."

Mr. Malthus further expresses a wish, that the principles of political economy were taught to the common people; but in this is not very sanguine, considering how very ignorant in general the educated part of the community is of those principles. He thinks, that "it ought to form a branch of an university education. Scotland has set us an example in this respect, which we ought not to be slow to imitate. It is of the very utmost importance that the gentlemen of the country, and particularly the clergy, should not, from ignorance, aggravate the evils of scarcity

every time that it unfortunately occurs. During the late dearths, half the gentlemen and clergymen of the kingdom richly deserved to have been prosecuted for sedition: after inflaming the minds of the common people against the farmers and corn-dealers, by the manner in which they talked of them, or preached about them, it was but a feeble antidote to the poison which they had infused, coldly to observe, that however the poor might be oppressed or cheated, it was their duty to keep the peace. Political economy is, perhaps, the only science of which it may be said, that the ignorance of it is not merely a deprivation of good, but produces great positive evil." Malthus's Essays, note, p. 553.

RECAPITULATION.

The different modes and methods proposed, as the easiest and most effective means of preventing future scarcity, brought into one view, are as follow:

1. The culture of the waste lands. The necessity of resorting to this resource will constantly press itself more and more into notice, and more particularly in unproductive seasons, when the necessity of increasing our extent of cultivated land will be most apparent.

2. The improvement of land already in cultivation. This is now, doubtless, progressively going forward, and will accelerate as the demand for its produce increases; and would be further accelerated by more attention from land proprietors and persons of fortune, who, possessing capital for the purpose, and having the advantages of education, would, by directing their talents to this purpose, be capable of making the greatest and most successful efforts in such improvements.

3. Improved agricultural and grazing systems. The introduction of green crops upon strong-land fallows, the keeping of all heavy live stock in stables, stalls, or sheds, and feeding them with cultivated herbage, or mown grass, would greatly increase our resources, by supporting a greater live stock with less grass land; and thus affording both more manure and more room for an extended cultivation for corn.

As the culture of wheat, at any price it has yet taken, for an average of seven years, has paid much less than grazing live stock, its growth ought to be encouraged; bounties upon exportation at a liberal price has this tendency, by forcing a market abroad when not wanted at home; and as such bounties have always

been attended with a good effect, by promoting the growth, and thus increasing the quantity; the export price should be raised, which experience has proved not to cause an advance of price in the home market. See page 308,9.

The introduction of oxen instead of horses, as far as it can be done, might increase the quantity of beef in the market; a commutation of tithes would both increase the quantity and lower the price of grain; and the granting of leases upon liberal principles, by increasing confidence, would promote improvements, and be a means of plenty. See the article Leases.

4. Increased attention to agriculture, from persons of education and fortune; who, by employing their talents and capital in general improvements, such as drainage, irrigation, inclosing and improving waste land, and manuring with marl and lime, might secure interest for their money so expended, and accelerate the improvement of their estates; as no tenant would object to pay interest for money thus laid out and judiciously applied; and it often happens that the occupier has not sufficient capital of his own for these purposes.

5. Vegetable diet promoted, fisheries encouraged, and beverage from fruit increased.

6. A more operose and extended cultivation for labourers; gardens, potatoe and cow ground annexed to their dwellings, and an emulation or spirit of industry amongst them promoted; by which means a part of their subsistence would depend upon their extra industry; they would be less affected by scarcities, as having their supplies more within themselves; and this part of our population drawing less from the markets would leave a greater plenty there for the other parts of the community.

7. By an improved and extended cultivation, upon principles herein proposed; by an improved economy in the management and subsistence of live stock upon such principles; by increasing the capitals and strength employed in agriculture; by a more operose and attentive cultivation, by lessening fallows and increasing crops, and by various other methods herein suggested, the probable supplies of human food may be increased to double, or even quadruple, of what is produced at present; but as the population has always a tendency to equal the supply of food, and unproductive seasons may, from all past experience, be naturally expected to occur at times, as matters of course, whenever such happen with respect to corn, substitutes should be immediately resorted to.

Mr. Malthus observes, "that the price of corn in a scarcity will depend much

more upon the obstinacy with which the same degree of consumption is persevered in, than on the degree of the actual deficiency; a deficiency of one half of a crop, if the people would immediately consent to consume only one half of what they did before, would produce little or no effect on the price of corn; a deficiency of one twelfth, if exactly the same consumption were to continue for ten or eleven months, might raise the price of corn to almost any height." Additional parish assistance should therefore, in such cases, be given, not in bread but in substitutes; and every proper means should, on such occasions, be used to lessen the consumption of corn.

CONCLUSION.

It remains for those who are at the head of society to determine, by their influence and example, whether a country shall go on in its natural course of plenty and prosperity, for its numbers will increase in proportion to the means of subsistence; or whether, by neglecting its natural resources, that course shall be checked, and those dreadful alternatives shall take place, which God and nature have appointed, to make room for a succession of future generations.

If the population of a country outrun its means of raising or acquiring subsistence, it must unavoidably be checked by scarcity, famine, and disease; for such is the inevitable law of nature, to level the population with the food of the world.

Other circumstances being the same, Mr. Malthus says, "it may be affirmed, that countries are populous according to the quantity of human food which they produce, or can acquire; and happy according to the liberality with which this food divided, which is measured by the quantity a day's labour will purchase. Corn countries are more populous than pasture countries, but their happiness does not depend either upon their being thinly or fully inhabited, upon their poverty or their riches; but on the proportion which the population and the food bear to each other." Their happiness must however depend, in a great measure, upon their morals, good order, and good government, which provides security both against internal commotions and external enemies; and as their strength will depend, in a great degree, upon their numbers and population, and consequently upon the degree of improvement and most perfect cultivation of the country, it is therefore both the interest and duty of those who have the power, to use every means of promoting such improvement, and thereby increasing the strength and security of their country.

It is admitted, even by the advocates for human perfectibility, that "a class of

people which maintains itself entirely by industry is necessary to every state, because the labour necessary to procure subsistence for an extended population will not be performed without the goad of necessity." This class of people too must always be numerous, and composed of the greater half of mankind.

But those who, by their situation and rank in life, are exempt from labour, have duties equally pressing and serious to perform; some must think, and others act: the class immediately above the labourer must find capital, or form plans, and inspect and assist in their execution; and the higher classes, in addition to their other duties and avocations, have it most in their power by example, authority, and influence, to introduce and give effect to many of the plans here suggested, for increasing the subsistence and consequent numbers of mankind; and which it is hoped and believed would tend to promote plenty, to better the condition of some of the lower classes of society, to increase the general and individual happiness, and to add to the resources, importance, strength, and security of the empire.

April, 1806.

APPENDIX.

In the Annals of Agriculture, Vol. XXXIV. page 511, date 1800, is given a method of preserving potatoes for a length of time in full perfection, by Mr. L. Millington; this, if it could be brought into extensive practice, for the use of public institutions, or the navy, bids fair to become a great resource in the case of a failure in the crop, or a scarcity of that root; and were it brought to perfection and practised upon a large scale, might very much assist a general scarcity. The account is as follows:

"I took $3\frac{1}{2}$ lbs. of potatoes, and had them peeled and rasped, and put them into a coarse cloth between two clean boards in a press, and pressed them into a dry cake like a thin cheese, which I placed on a shelf to dry; a quart of juice was expressed, to which I added a quart of cold water, and in about an hour it deposited 60 grains of very white starch or flour, fit to make pastry. This cake was kept near three years perfectly sweet: the potatoes lost about two-thirds in weight by the process, but upon being dressed, either by steam or otherwise, will produce nearly the same weight and quantity of food the potatoes would do.

"Potatoes, after washing and peeling, and cleaning from discoloured specks, might be pounded or ground, and pressed into these cakes or cheeses, for the use of the navy, or against scarcity, and might supply this important article of food in all seasons. Machinery of the nature of the washing machine, and cider press, might greatly facilitate this mode of preservation."

He further says, "I boiled a piece of the cake made three years ago, and it turned out perfectly sweet, and pleasant to the taste. It is necessary the potatoes should have been perfectly ripe to keep well."

I think this experiment well worthy of being pursued further; and if some quick and expeditious, and consequently cheap method could be introduced, of thus preparing and preserving large quantities of this article of food; and a market opened for its sale in this form and state of preservation, it might prove a great resource in future scarcities, and is well worth encouraging by premiums.

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COMMUNICATIONS

TO THE

BOARD OF AGRICULTURE;

ON SUBJECTS RELATIVE TO

THE HUSBANDRY,

AND

INTERNAL IMPROVEMENT

OF THE COUNTRY.

VOL. V. PART II.

——— ARATRO
DIGNUS HONOS——— GEORG.

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1807.

COMMUNICATIONS, &c.

No. XVIII.

An Essay on the Nature, Produce, Origin, and Extension of the Merino Breed of Sheep: to which is added, a History of a Cross of that Breed with Ryeland Ewes; describing their Qualities and Produce, and a successful Method of managing them. By Caleb Hillier Parry, *M. D. F. R. S. Member of the Royal College of Physicians of London, and of the Medical Society of Edinburgh; Honorary Member of the Physical Society of Gottingen; a Vice-President of the Bath Agricultural Society; one of the Physicians of the General Hospital, and Physician to the Casualty Hospital and Puerperal Charity in that City.*

"Magna et pecori gratia." PLINY.

PREFACE.

It is proper that I should inform those who may peruse the following pages, that the greatest part of the history of the Merino breed of sheep now existing on the continent of Europe, is a compilation from the following works: Bourgoing's "Tableau de l'Espagne moderne;" "Faits et Observations sur les Merinos "d'Espagne," by Charles Pictet of Geneva; "Communications to the British "Board of Agriculture," by M. M. Fink and Schulz; the "Comptes rendus à la "Classe des Sciences," of the National Institute at Paris, respecting the flock of Rambouillet; and, more especially, "Traité sur les Bêtes à-laine d'Espagne," and "Histoire de l'Introduction des Moutons à laine fine d'Espagne dans les "divers Etats de l'Europe, et au Cap de Bonne Esperance," both by Lasteyrie.

Of the last named author it is impossible for me to read the entertaining and instructive volumes, without feeling the deepest regret, that he should have debased them by a story of an assassination pretended to have been committed on a manufacturer of fine cloth in Spain, by order of Lord Stanhope, many years ago Ambassador to that court. The English have not yet learned the trade of assassination. This tale affords a striking proof how much the best minds are capable of being perverted by being habitually conversant with enormous crimes. Eighteen years ago M. Lasteyrie himself would have been ready to exclaim, in the words of Hazael, "What! is thy servant a dog, that he should *suspect* this great thing?"

In my research into the origin of the Merino race, I have largely availed myself of the "Historical and Chronological Deduction of Commerce," by Adam Anderson, and the Treatise on Wool, by Smith; the latter a prolix and garrulous writer, but both containing an immense magazine of important facts, which, upon the whole, are very faithfully stated. From these two collections I have been contented to borrow, when unable to recur to the original works. It is on occasions like these that I regret my distance from an University or the Capital; but I have the greatest pleasure in publicly expressing how much that want has been lessened by the free use of the valuable library of my excellent and learned friend Dr. Falconer.

Since this work was first presented to the Board, I have obtained from Messrs. Jones', opticians, in Holborn, a good apparatus, by means of which I have been able to make very accurate measurements of a great many specimens of wool. The result of these examinations, and of various other observations on the breed which constitutes my flock, I have thought it best to throw into a Supplement, which will be found annexed to the original treatise.

The subject, however, is still far from being exhausted. In fact, it cannot be said that the experiment is much more than merely begun. In return for the premium, and various other marks of approbation with which the Board has been pleased to honour me, I shall think myself under the strongest obligation to communicate to them any farther observations which my professional engagements may allow me to make, and which may be worthy of them to receive.

Bath, Sept. 21, 1806.

PART I.

NATURE, PRODUCE, ORIGIN, AND EXTENSION OF THE MERINO BREED OF SHEEP.

CHAPTER I.

Question proposed by the Board of Agriculture.—Quantity and Value of the superfine Wool imported into England from foreign Countries.

The Board of Agriculture having thought it worthy of their attention to offer a premium for "the best essay on the growth of wool from the Spanish breed of "sheep, or from some cross between the Spanish and British breeds, in Great Bri- "tain, which shall include a detail of experiments made, with a full explanation of "the advantages that may have attended them in respect of wool, carcase, applica- "tion of food, freedom from distempers, cross in the breed, &c.; and which shall "point out the most effective means of spreading this race of sheep;" I shall endeavour, in the best manner I can, to fulfil the views of the Board. In so doing, I shall think myself justified in taking a wider field than that which is described in the terms of this premium; and shall draw from every pure source within my reach, such facts as my serve to inform the agriculturist and the public on a subject of such great and increasing importance.

In order to afford the reader some means of learning the magnitude of the object of which I am about to treat, I lay before him the following statement, derived from good authority, more particularly from an account delivered to Parliament during the present session, of the wool purchased in foreign countries in the years 1802, 1803, and 1804, and employed in Great Britain for the manufacture of our finest woollen goods; in which statement I shall include the probable expence to this country of the wool so purchased.

In the three years specified, there were imported, of Spanish wool, directly

from Spain,	16,986,644 lbs.
Holland,	403,400
Portugal,	400,723
Gibraltar,	288,274
France,	252,222
Germany,	122,150
America,	10,567
Prussia,	3,357
Denmark,	381
Total	18,467,718 lbs.

Of this quantity, about 15,307,718 lbs. were imported in Spanish or neutral vessels, and the remaining 3,160,000 lbs. in English vessels.

Of the quantity imported in Spanish or neutral vessels, about 15,141,900 lbs. were sheep's wool, and 165,778 lbs. lambs wool. Of the sheep's wool the proportions were, of the R, or first sort, about 12,000,000 lbs.; of the F, or second sort, about 2,000,000 lbs.; of the T, or third sort, about 1,127,000 lbs.; and of the K, or coarsest sort, about 14,920 lbs.

The average prices given for these wools by the clothiers in England were nearly as follows:

R, sheep's wool,	12,000,000, at 6*s.* per lb.	£.3,600,000
F, ditto,	2,000,000, at 5*s.*	500,000
T, ditto,	1,127,020, at 4*s.* 6*d.*	253,579
K, ditto,	14,920, at 3*s.*	2,238
Lambs wool,	165,778, at 4*s.* 3*d.*	35,227
	15,307,718 lbs.	£.4,391,044

These £4,391,044. were the sum paid by our clothiers for this wool. What the merchants' profit might be, I do not presume to determine; but if we allow 15 per cent. inclusive of interest, or £658,656. the remainder, or £3,733,288. will be the sum actually paid out of the kingdom for this part of the imported wool.

Besides these quantities, there were imported in British vessels about 3,160,000lbs. of Spanish wool; of which the respective proportions were, probably, nearly as follows:

R, sheep's wool, -	2,477,182 lbs.	at 6*s.* -	£.743,154
F, ditto, - -	412,864	at 5*s.* -	103,216
T, ditto, - -	232,652	at 4*s.* 6*d.* -	52,346
K, ditto, - -	3,079	at 3*s.* - -	461
Lamb's wool, -	34,223	at 4*s.* 3*d.* -	7,272
	3,160,000		£.900,449

From the gross amount of the latter sum, which is what is paid by the manufacturer, there must in this case be deducted not only the merchant's profits, but also the expences of freight and insurance. These I cannot with any accuracy state.

There were brought into England within the same period from Germany, 561,604 lbs. of wool not called Spanish, but a great deal of which was of the same quality. Of this I know not the quantity, and therefore cannot estimate the value.

There is the same difficulty with regard to 613,059 lbs. of wool imported from Africa and the Cape of Good Hope; of which it will be hereafter seen that a part of which was of the finer kind.

From Portugal there came also 486,124 lbs. the greater part of which was probably equal to the third, or even the coarser second sorts of Spanish wool; but of which I cannot ascertain either the quality or the actual price.

From these data, gross as some of them are, little doubt can be entertained, that during the three years in question, Great Britain paid to foreign countries for the wool which was the chief basis of its fine woollen manufactures, at least £4,700,000. or upwards of £1,560,000. per annum.

CHAPTER II.

Merino Sheep in Spain; their Form; Quality and Weight of their Fleeces. Difference of Flocks. Yolk. Loss of Weight in scouring. Chemical Nature of the Yolk. Equality of Wool in different Parts of the Fleece. Wool of the Lambs. Constitution and Habits of Merino Sheep. The Rams only horned. Increase of the Species. Merinos rarely eaten. Pastures. Travelling. Shearing. Sorting the Wool; washing it. Lamb's Wool. Wool of the Estantes. Diseases; the Scab; Giddiness; the Claveau. Nature of the Mesta.

The fine wool imported into England is the produce of a breed of sheep called in Spain Merinos.

The number of these sheep, according to the latest information, amounts to about five millions. They are divided into two sorts; the Trashumantes, and Estantes. These terms are not meant to indicate any difference in the species, but are Spanish participles, merely importing that the former travel, and that the latter are stationary.

The Merino sheep in Spain is an animal below the middle size, comparatively with our native English breeds, and probably about that of the pure Ryeland, or old South Down. Though these sheep possess a great deal of picturesque beauty, and are exactly such as Rosa of Tivoli and others of the best painters have chosen as models, from which to decorate their immortal works, they are by no means furnished with that form, which modern fancy or experience has presumed to be inseparably connected with a disposition to early maturity and fatness. Thus they are, in general, rather high on their legs. Their heads are large, and their necks long. Their chests are contracted, and therefore they are sharp on the shoulders and flat sided. They are also narrow across the loins; whence it inevitably follows, that their hind quarter is strait and defective.

In all these respects, however, there is great difference in individuals of the same flock, and more especially in the general character of form in different flocks of this race.

The defects which I have mentioned are, however, in some degree counterbalanced

by the peculiar quality of the skins of the Merino sheep, which are remarkably thin, soft, and loose, affording that evidence of a strong disposition to fatten, which many of our farmers call "Proof."

There is another respect in which the skin of the Merino race differs from that of our native sheep. It is of a fairer hue, with a vivid tint of what is called carnation or flesh colour; bearing the same relation to that of our English breeds, as the skin of women with red or auburn hair does to that of those whose hair is dark brown, or black. This tint is particularly conspicuous on those parts which are naturally free from wool, as the eye-lids and lips.

With this peculiar condition of the skin is connected that quality of the fleece, which has hitherto been generally considered as the chief characteristic of the Merino race: I mean its fineness and flexibility, in which it is probably superior to any other breed in the known world. On this point I shall hereafter give some farther particulars.

These animals seem absolutely buried in wool. It exists on their foreheads almost as low as the eyes, and on their cheeks; covers their bellies, and envelopes their hind legs, and sometimes their fore legs, down to their very hoofs.

The length of the staple, or filaments, of wool is from two to somewhat more than three inches; being much alike on the shoulder and on the rump. The wool of the ram is generally esteemed the coarsest and longest; that of the ewe finest and shortest; and that of the wether, in both respects, between the two former.

According to M. Lasteyrie, one Merino sheep with another gives five pounds of wool unwashed on the animal's back. Now the French pound being to the English as 109 to 100, the English weight per fleece will be 5 pounds seven ounces and nearly a quarter. In the Compte rendu à la Classe des Sciences of Paris for the year 10 (1802), we are told that the fleeces of thirty ewes recently imported from Spain weighed, unwashed, 99 kilogrammes and a half. The kilogramme is 2,04438 livres, or pounds: therefore $99\frac{1}{2}$ kilogrammes make 203,41581 pounds, which, as before stated, are equal to 221,72329 pounds English, or nearly $221\frac{3}{4}$ lbs. This sum divided by the number of fleeces, gives 7,3907, or about 7 pounds $5\frac{1}{2}$ ounces English for the weight of each. It appears, however, in abatement of this extraordinary size, that these fleeces were of thirteen months growth; and it is certain that the sheep which they clothed had been selected with the minutest care from the most productive of the Spanish flocks. There is no doubt that the weight quoted above

from Lasteyrie is at least equal to that of the average of the mere ewes' fleeces the Merino flocks in Spain. Those of the ewes, which have not been impregnated, are heavier than those of the same age, which have not borne lambs during that season. Of the rams fleeces in Spain, it is probable that the medium weight does not exceed seven pounds.

With regard to all these weights there is great difference, arising from causes, some of which are unknown to us, and others sufficiently certain. To these I shall occasionally advert as I proceed, contenting myself at present with specifying only two.

There are a great number of Merino flocks belonging to different proprietors, who are chiefly grandees, or societies of monks. Many of these flocks seem to be distinct varieties of the race, differing in the form and size of the carcase, and in the weight and fineness of the fleece. Among them one of the most noted is that of the Count del Campo Alange, which, from another title in the same family, is called Negrette; and which, having been the root of that in the possession of our gracious Sovereign, has been by him liberally distributed throughout this island. This flock, which is said to consist of at least sixty thousand sheep, has, according to Bourgoing, the largest carcases and the heaviest fleeces, though of a wool, which, neither by the merchants in the country, nor by foreigners in general, is esteemed the finest. Other celebrated flocks are that of the Duke de l'Infantado; that of the Carthusian monastery of Paular, amounting to thirty-six thousand, lately purchased by the individual styled the Prince of the Peace; those of the monasteries of Guadeloupe and the Escurial, and others. Lasteyrie confirms Bourgoing's account of the superior size of the Negrette breed, but says that the race of the Escurial is supposed to have the finest wool of all. The flock of Guadeloupe is remarkable for the good proportions of the carcase, and the weight and fineness of its fleeces; and in the two last respects it is, on the continent, said to be equalled by the Paular race.

This variety in the Merino sheep affords, therefore, one essential ground of difference as to the weight of the fleece.

Another cause of difference, which may also respect different breeds, and which certainly influences different individuals of the same variety, is the proportion of the grease, or yolk, which imbues all wool, but pre-eminently that of the Merino. In consequence of this superabundance, the fleece involves in it, to about one-sixth

of its depth from the surface, a great quantity of dust, earth, and other matters, either floating in the air, or lying on the ground, so as to give the Merino sheep a very dark and dirty hue, corresponding chiefly with the colour of the soil. As it happens that the finest fleeces have, usually, the greatest quantity of yolk, we may, in unwashed sheep, living together, of the same age and at the same season, form a tolerably accurate conclusion as to the fineness of the wool from the degree of darkness on its surface; which is also greatest on the finest parts of the fleece, as on the neck, shoulders, and sides. Notwithstanding this superficial darkness, the wool, when drawn asunder, has, nearer the skin, a brilliant silky appearance, and, when scoured, is of the purest white.

According to Lasteyrie, when the fleeces undergo the operation of washing for sale, which is never performed on the sheep's back, but always after the wool is sorted, they lose three-fifths of their weight. Bourgoing states this loss as being usually two-thirds; but if we follow Lasteyrie, we find that five pounds, or eighty ounces, become thirty-two ounces. Afterwards, in scouring by the clothier, a further loss is sustained of about three, or three and a half, in twenty. Hence the thirty-two ounces are reduced to about twenty-six ounces and a half; which are somewhat less than one-third of the original weight of the wool in the full yolk. We may, therefore, state the average reduction in scouring the Merino wool of Spain to perfect cleanness, to be at least two-thirds of the original weight of the unwashed fleece.

It is found, however, that the quantity of the yolk is different, not only in different individuals, but in the same individual at different seasons. I do not know that any very nice observations have been made on this subject; but, as the greater part of the yolk is easily miscible with water, it is obvious that a dry or rainy season must make some variation in the quantity adhering to the wool, and therefore in the eventual relative weight of the fleece. Whether the temperature of the season has any influence on the production of the yolk, has not been hitherto positively ascertained; but as I know that the fleeces of Lord Somerville's flock of pure Merinos in England waste in scouring only one half, it is highly probable that the proportion of yolk, in some degree, keeps pace with the heat of season or climate.

The French literati, always assiduous in applying the knowledge of nature to the improvement of the arts, have not been idle on the subject of the yolk of wool.

Accordingly we find, from an imperfect analysis of this substance by Vauquelin, published in the Annales de Chymie for the year 11 (1803), that it contains a large proportion of fatty matter united with pot-ash, so as to form a natural soap; a smaller portion of pot-ash combined partly with carbonic, partly with acetous, and partly with muriatic acid; a little lime in a state of unknown combination; a small quantity of uncombined fatty substance; and a little animal matter, which seems to produce the peculiar waxy smell. The yolk is probably formed from the perspiration of the animal; and a knowledge of its component parts has given Vauquelin occasion to draw some important conclusions, and to suggest some specious hints.

The greatest loss in freeing the wool from this yolk and all its other impurities, according to that author, is only from 35 to 45 per cent. But then he mentions that the specimens which he washed were very dry; and it is probable, also, that he selected only the finest parts of the fleece, which did not require much picking or rejection; whereas the coarser parts are loaded with various kinds of ordure, which, as they are not mentioned by Vauquelin, could not have existed in his specimens. I find, on more accurate examination, the same thing to be true with regard to the Anglo-Spanish wool mentioned in my former publication,* in which I speak of it as only losing five-sixteenths, by reduction to the state of wool of commerce. The loss in scouring and picking the whole fleece to absolute cleanness, is fully equal to that which I have before stated.

The wool of the Merino sheep differs from that of all our breeds, in being of nearly an equal degree of fineness on the shoulder and on the rump. It grows more thickly on the latter than on the former.

The whole fleece is remarkably free from those white, opake, and coarser hairs, called by the French, jarre, and by us, kemps, stitchel hairs, or cat's hairs. Those which here and there occur among Merino wool, are extremely short, and easily drop out during the processes of manufacture, so as not to injure the fabric.

The wool of the Merino lambs, in general, is evidently coarser and harder than that of the sheep. It seems, however, that different flocks vary in this respect. The lambs of the Infantado and Paular races are covered with a coarse sort of hair, which afterwards changes into very fine wool. The same appearance is sometimes to be found among the lambs of the Negrette breed in England.

* Facts and Observations, page 46.

It has been stated by some writers, and among the rest by Mr. Charles Pictet of Geneva,* that the Merino is longer in coming to maturity than most other breeds. He says, that they do not acquire their full growth till three years old; that they shed and renew their teeth some months later than the native breeds of France; and that, though the rams are fit for generation at a year old, the ewes rarely take the ram till they are eighteen or twenty months old; and some not till they have reached thirty months. This statement seems, in some degree, invalidated by certain facts related by the same author, who informs us, that the average weight of six ram lambs of the pure blood, at twenty-five days old, was about 16 lbs. English. On the 28th of April following, one of these lambs being then four months old, weighed 51½ lbs. English; and, on the 4th of June, at the age of between twenty-two and twenty-three weeks, the heaviest of the lot weighed nearly 65 lbs. English. Mr. Pictet himself expresses some astonishment at finding that the weight of this lamb was greater than that of those of the new Leicester and South Down breeds, which, according to him, are stated by Mr. Young (Annals of Agriculture, Vol. XXXV.) as being only 57 lbs.†

If, however, these sheep are slower in becoming adult, it is generally agreed that they are much longer-lived than other known races. They sometimes keep their teeth to fourteen or fifteen years of age; and, according to Pictet, there was in the possession of Cit. Marais, at Nogent, in the year 1802, a Merino ewe, which, having come from Spain in the year 1786, could not be less than sixteen years old. She had then all her teeth, and had brought a lamb the preceding winter.‡ Huzard relates other instances of the same kind in the flock of Rambouillet.§

M. Pictet mentions some other curious particulars with regard to the Merino race; as, for example, that they eat more indifferently of all sorts of food than other sheep;‖ that they regularly share their milk with the progeny of other ewes, so that while their own lamb is sucking on one side, they admit, without reluctance, a stranger to occupy the other;¶ and that the adult sheep have an erect mien and measured step, and the lambs an indisposition to frisk and gambol, like those of other breeds. In the latter respect these animals, according to him, seem to partake of the stateliness and gravity which characterize the human inhabitants of their

* Pictet Faits et Observations sur les Merinos d'Espagne, pages 14, 23, 24.

† Ibidem, page 3. ‡ Ibidem, page 14. note. § Daubenton Instruction pour les Bergers, page 107. note. ‖ Pictet, page 13. ¶ Ibidem, page 25.

native country. They are also remarkably timid; but I do not know that there is any thing peculiar in what he remarks of these sheep, that nothing seems to give them activity but fear, hunger, sensual desire, or jealousy.* All those who have had an opportunity of observing these rams in England have agreed, that they are extremely salacious; and their capacity in this way corresponds with their structure, and far exceeds that of our native breeds.

There is one striking particular, in which the Merino race differs from every breed of short-woolled sheep with which I am acquainted, either in this or in other countries. While very few of the rams are polled, or have short snags, the majority have large spiral horns; and, on the other hand, a horned Merino ewe is rarely to be found.

The Merino rams and ewes in Spain form separate flocks till the beginning of July; when those, which are appropriated to the increase of the species, are put together, and suffered to continue till the middle of August. The youngest rams so chosen are from two to three years old; and they continue in use till eight or nine. There seems to be little farther ground of preference of one ram to another, except that the shepherds studiously avoid all those which have black spots on their bodies, or in their mouths. The period of union in the ewes is from two to seven years of age; though, sometimes, the two tooth ewes are permitted to copulate. One ram is generally allotted to twenty or twenty-five ewes.

The ewe rarely produces more than one lamb at a birth. The lambs fall in November and December. The common custom is immediately to kill one-half of these; or even three-fourths, or more, if the season is bad, or there is any probability of want of food. This massacre is first practised on the males; of which, however, they take care to preserve a sufficient number to maintain the stock. In every hundred and eighty sheep the proportion is usually as follows: 100 ewes, 50 lambs, 25 wethers, and 5 rams. One reason why half the lambs are destroyed is, that each which remains may have the benefit of two nurses; for the Spaniards hold that the wool of the ewe would be injured both in quantity and quality, if she were exhausted by being obliged wholly to support her lamb. In order to produce this curious association, the shepherds take off the skin of a lamb which is killed, and wrap in it another which has already been suckled by its natural mother. The lamb so dressed they bring to the ewe which has been deprived of its young one; and

* Pictet Faits et Observations sur les Merinos d'Espagne, page 25.

which, deceived, as they say, by its appearance, allows the stranger to suck her. This operation they repeat three or four times in twenty-four hours; and, by the next day, the animals generally take to each other of themselves. When the ewe is not readily deceived, and is in consequence refractory, they reduce her to order by tying her by the leg to a stake. The lambs continue to suck till the flock commences its journey to the mountains, which is when they are about five months old.

Very few, perhaps none, of the ram-lambs are castrated. The wethers abovementioned are rams, cut at the age of six or seven years, when no longer fit for propagation. The mutton which they yield must, of course, be very bad. In fact, this breed is rarely eaten except by the shepherds themselves, or others connected with the flock; and by them usually in the mountains. So little, indeed, are these sheep considered as an article of food, that though immense flocks of them pass through or near Madrid twice every year, the beef and pork of that capital are supplied from the neat cattle and pigs of France, and the mutton from the sheep of Africa.

During the winter, the Merino flocks cover the plains of some of the warmest and most fertile provinces of Spain. Such are Valentia, Murcia, Arragon, Castile, La Mancha, Andalusia, Estremadura, the neighbourhood of Cadiz, &c. The herbage of these countries, which had been burnt up during the summer, begins to re-appear on the first autumnal rains; after which it pushes so rapidly, and acquires such a degree of luxuriancy, that the shepherds are often obliged to fold their flocks, which they do by means of nets, in order to prevent their injuring themselves by feeding too hastily. Thus the herbage continues to shoot more or less during the whole winter. But as soon as, from the increasing heat of the sun and the constant consumption, the feed begins to fail, which takes place from the middle of April to the beginning of May, the flocks commence their journey to the mountains of Leon, Castile, Arragon, Navarre, Gallicia, Soria, Segovia, Cuenças, Albarazin, Burgos, the Asturias, &c. The tops of many of these mountains are in the winter covered with snow, but, in the summer, enjoy only a refreshing coolness, and are well clothed with short herbage, admirably suited to the animals which they are destined to support. This herbage, according the author of the Oryctographia et Zoologia Arragoniæ,* chiefly consists of *Festuca ovina* (sheep's fescue), *Aira cristata* (crested hair-grass), *Trifolium repens* (white trefoil), and *Medicago lupulina* (melilot snail-shell).

* Page 60.

The beginning of the journey of each flock is in some measure regulated by the distance which it has to travel. Those which go from Estremadura to the Asturias have a march of at least 550 English miles. They proceed towards the mountains at the rate of from 5 to 16 miles a day, according to the pastures which they meet with by the way; and more slowly before than after shearing. A road is left for them, which is held, as it were, sacred, of 80 or 90 varas, or about 75 yards in breadth, often marked out or bounded by stones. There are several of these roads, through which pass different divisions of those immense flocks, so as to arrive about the same time at the place of their ultimate destination. This variety permits them also to choose or avoid, on their march, those districts of land which are sown with various kinds of grain, according as they have been gathered or not.

Each Cavana, or great flock, has a Mayoral, or principal shepherd; and each subdivision of such a flock, which, for convenience of travelling, consists of from 1000 to 1500, has its leading shepherd, who goes at its head, and is accompanied by two others, who proceed respectively on each flank. Each leader has for his companions one or more Mansos, which are old wethers, or, what is more extraordinary, frequently old castrated goats, each of which is furnished with a large bell about its neck. These bell-wethers being much caressed, become extremely docile; and are very useful in guiding the flocks to which they are attached.

The shepherds are accompanied with dogs; which are not, as ours of the present day, intended to regulate the movements of the flock, but are large and fierce mastiffs, like those of the Pyrenees, solely calculated to protect the sheep against wolves and robbers.

The rams, ewes, and lambs travel together till they reach the mountains. There the flock is ultimately divided into parts, and an allotment of pasturage made to each. The rams are separated from the ewes, and the lambs of each division are incorporated with the ewes of other divisions.

Thus each cohort from time to time changes its place among the mountains, according to its want of food; dispersing itself abroad in the cool of the day, and carefully collected during the extreme heat of the sun; and at night, under the protection of the shepherds and their dogs, and sometimes, though rarely, surrounded with an inclosure of strong nets. Once a day, the sheep are regularly led to drink. It is calculated that a fanega of land, or about $\frac{1}{2}\frac{1}{5}$ of an English acre, is required for the summer keep of each sheep.

About the beginning of May, if the weather is fine, the flocks, while still on their journey, are conducted to the Esquileos, or shearing-houses, which are nearest to their respective roads. These houses are built in the mountains, chiefly at Segovia, Avila, Burgos, Soria, Cuença, &c.

On this subject there are many particulars worthy of note. One is the vastness of the Encerraderos, or houses of reception for the sheep, before and after shearing; some of which are capable of containing 20,000 sheep at once. All those which are intended to be shorn in one day, are kept in an adjoining building closely shut, called a Sudadero, or sweating-house; in which they are so crowded, as to have scarcely room to move, or even to breathe. This practice, which has for its pretended object an increased facility of shearing, is probably intended to augment, by perspiration, the weight of the fleece, and therefore its price. To promote this effect, some persons even agitate their flocks as much as possible within the Sudadero. A further fraud of this kind is said to be practised, by the proprietors of certain small flocks in the kingdom of Murcia, who, some days before shearing, drive their flocks into the newly ploughed fields, in order that they may contract as much as possible of dust and dirt. With the same view, the fleeces, when shorn, are put into a damp warehouse, all the doors and windows of which are closely stopped, so as not to admit of the least transmission of vapour. This warehouse is not opened till the merchant, a few days afterwards, comes to weigh the fleeces.

One with another, each man shears fifteen sheep per day. If by accident the skin is wounded, they drop on the part a little powdered charcoal, which, they say, tends to heal the wound, and guard it against the fly.

It is said that, after shearing, they formerly used to rub the body of the sheep all over with an ochreous earth called almagra; which was supposed to defend the denuded skin against the various inclemencies of the air. This practice no longer exists.

It seems, however, that the Spanish flocks have occasionally suffered very much after shearing. That of the Count del Campo Alange is reported to have lost five or six thousand in a single night. In order to guard against this evil, they keep the Encerradero in bad weather full of sheep newly shorn, sometimes for two, or three successive days, during which time they, designedly, avoid giving them any food whatever.

The lambs are shorn without being previously sweated. The shearing lasts twenty or thirty days ; during which time the sheep are draughted, and those which are old, feeble, or sick, are given as food to the workmen, in the proportion of one sheep to eighteen persons.

The flock now again begins its route among the mountains, where it continues in the manner above described, till the latter end of September, or beginning of October ; when it sets off again on its return to the valleys. The ewes having received the ram in the month of July, and being now consequently pregnant, travel more slowly than on their former journey ; and, for the purpose of accommodation to the various crops, often return by different roads from those through which they had before advanced. They are driven into the newly harvested fields, and, if food be scarce, even into the vineyards after the vintage, where they are allowed to crop the luxuriant and succulent leaves of the vine. It appears, also, that they are suffered, during their journey, to brouze on all the young trees, shrubs, and newly felled wood ; and in the winter, when herbage is scarce, the shepherds cut down for them those branches of the evergreen trees, which are out of the reach of the sheep.

It is customary to give all the Merino sheep in Spain, whether Trashumantes or Estantes, a certain quantity of salt ; but the former have it only when in the mountains, and, as we are told by Lasteyrie, in the proportion of six or seven hundred grammes each per month. A gramme is 18.841 grains French. According to Perrault, the French grain is smaller than the English, in the proportion of 134.5, to 158. One gramme is, therefore, equal to 16.0387 English grains ; and as our avoirdupois ounce contains about 438 grains, 700 grammes, are 11227.09 grains, or somewhat less than $25\frac{1}{2}$ ounces avoirdupois for thirty days. If we reckon only 600 grammes, the quantity will be about $21\frac{3}{4}$ ounces. In the first case, the daily allowance to each sheep will be three quarters of an ounce, and about 43 grains ; in the second case, half an ounce and $96\frac{1}{4}$ grains, or nearly three quarters of an ounce. This daily proportion of salt to such an animal as a sheep is so great, that I think there must be some error ; unless it be meant to include the consumption by the shepherds, and all other kinds of waste.

A more minute account of this practice is given in the Annual Register, for 1764, in a letter from a gentleman in Spain, to the late Mr. Peter Collinson. " The first thing" says this writer, " which the shepherd does when the flock returns

"from the south to their summer downs, is to give them as much salt as they will "eat. Every owner allows his flock of a thousand sheep, one hundred arroves, or "twenty-five quintals of salt, which the flock eats in about five months; they eat "none in their journey, nor in their winter walk. The shepherd places fifty, or "sixty flat stones at about five steps distance from each other; he strews salt upon "each stone; he leads the flock slowly through the stones, and every sheep eats "to his liking. But then they never eat a grain of salt, when they are feeding in "lime-stone land, whether it be on the grass of the downs, or on the little plants of "the corn-fields after harvest-home. The shepherd must not suffer them to stay "too long without salt. He leads them into a spot of clayey soil, and in a "quarter of an hour's feeding, they march to the stones, and devour the salt. If they "meet a spot of the mixed soil, which often happens, they eat salt in proportion."* Now if we suppose the quintal, or hundred weight, to be that of Cadiz, which is to the English as 109 to 105, and allow 150 days for the whole period of feeding with salt, the quantity consumed by each sheep per diem, will be $121\frac{1}{4}$ grains; which is $11\frac{3}{4}$ grains more than a quarter of an ounce avordupois. This quantity is not much more than one-third of that stated by Lasteyrie; but, as far as one may be permitted to judge from the analogy of the human race, seems to be a very ample allowance.

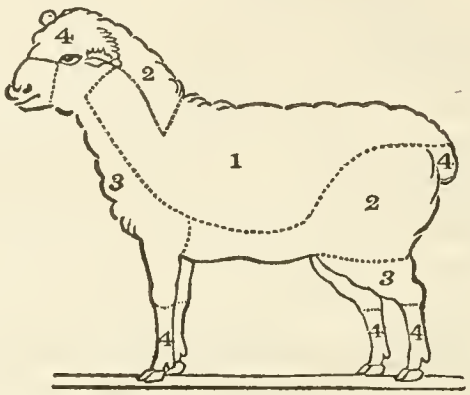
It is generally believed in Spain, that the salt contributes not only to the health of the animal, but to the weight and fineness of the fleece.

Soon after the shearing of the Merino sheep, another important operation takes place, which is that of sorting the wool. This among the Spaniards, as with us, is a distinct business, to which it is required that the workmen serve an apprenticeship of five years.

The wool is divided into four parts. The first, which is called by the Spaniards Floreta, or Refina, and by the French Laine-mere, is taken from the flanks, the back as far as to the tail, the shoulders, and sides of the neck. The second, or Fina, comprises the wool of the top of the neck, the haunches, as far as the line of the belly, and the belly itself. The third, Tercera, is that of the jaws, the throat, the breast, the fore thighs to the knees, and the hinder thighs from the line of the belly, down to the hocks. The fourth, or Cahidas, is that below the hocks, between the thighs, the tail, the buttocks, the pole, and behind the ears; and all that which shakes out

* Annual Register, 1764.

of the fleece in shearing, or in washing. In the drawing which I annex from Lasteyrie, the parts of the sheep which furnish the wool of these respective qualities, are included within the corresponding lines, and indicated by the figures, 1, 2, 3, and 4.



A set of bags, containing the whole of the three first sorts of a certain number of fleeces, is called Pila, or a pile; and each bag is marked with the initial of the name, which expresses the quality of its contained wool, R. F. or T. The profit arising from the sale of the fourth sort, or cahidas, which is marked C. or K. is allotted for the consolation of souls in purgatory; an end, to which no great aid is contributed by the merchants of England.

It was many years ago supposed that in a pile of Spanish wool, the proportion of the three principal parts was R. 15 parts, F. 4, and T. 1. Even in this case the fleece must have been sorted more coarsely, than is expressed in the foregoing drawing. Of late years, as the wool has risen in price, the quantity of the finer sorts has been increased, and their quality proportionably deteriorated, by the admixture of those of a lower value. This is well known to our manufacturers, and venders of superfine cloths. Part of what should be Fina is mixed with Refina, and the Tercera probably borrows of the Cahidas. Hence, as I have stated in my account of imported Spanish Wool, in 20 parts of wool the R. now forms from 16 to 17, the F. from $2\frac{1}{2}$ to $3\frac{1}{2}$, and the T. from $\frac{1}{2}$ to $1\frac{1}{2}$. It is a very favourable division to the buyer when, in 20 parts, the R makes 16, the F $2\frac{1}{2}$, and the T $1\frac{1}{2}$. It is even probable that the weight of the sheep's wool is at this time augmented by the addition of part of that of the lambs, in spite of the prohibition of that practice by law in the provinces of Leon and Segovia. Perhaps, too, none of the sorts are without a

mixture of the wool of those sheep which have died of disease before the time of shearing.

As soon as the wool is sorted, it is reduced, by washing in hot water, to the state in which it is usually imported into this country. This process being very important to the interests of the grower of fine wool in England, I shall relate it at large hereafter, with such improvements as have been made in it by the superior energy and chemical knowledge of the French.

In the process of washing, the wool of the rams, wethers, and ewes is indiscriminately mixed; but, as I have before observed, that of the two former bears a small proportion to that of the latter. I have already specified the reduction of weight which the wool suffers by washing. After it is thoroughly dried, it is put into bags, each of which is marked not only with the first letter of the sort, but with certain letters, or anagrams, expressive of the flock from which the wool was derived. These bags contain each about two hundred weight of wool.

The wool of the lamb is supposed in Spain to be too short and weak to be made into cloth by itself; and, when not clandestinely mixed with that of the sheep, is usually reserved for the manufacture of hats. That part of it which is imported into England is, I believe, employed in various other useful fabrics.

Of the five millions of Merino sheep which I have described, about one-tenth part are said to be Estantes, or stationary. From the concurrent testimony of Bourgoing and Lasteyrie, who were, probably, eye-witnesses of what they relate, it appears that, although there is in Spain, as in England, a prepossession in favour of the effect of travelling on the wool, which the great proprietors have obviously their interest in encouraging, several of these stationary flocks yield fleeces equal in excellence to the best of the Trashumantes. Thus in Estremadura, and even Segovia, there are flocks which never travel, and the wool of which in no respect differs from that of the other sort. In one part of the country, which exports annually 20,000 arrobas of fine wool, nearly one-third is furnished by the stationary sheep.

The diseases to which the Merino breed is chiefly subject, in Spain, are, the scab, in French la Gale; giddiness, in French la Tournie, le Tournoi, or le Tournoiement; le Lourd, or la Lourderie; and an eruptive infectious disease, like the small-pox, fortunately unknown in England, and for which, therefore, we have no name. The French call it le Claveau, la Clavelée, and sometimes even la

Pourriture; though the last more properly and generally signifies the rot. I cannot find that the Spanish shepherds employ any measures worthy of note for the cure of these maladies, unless it be of importance to announce, that, when other means fail, they have recourse to magic.

Every thing which respects the maintenance of the flocks in Spain, as well Merinos as the other class of sheep, which are coarse and long-woolled, and called Churros and Burdos, amounting all together to about thirteen millions, is directed by a code of laws called the Mesta, the chronology of which is unknown, but which first received the sanction of government about the year 1450.*

By this code are regulated the great body of flock-masters, consisting of the most powerful grandees, the wealthiest private individuals, and the best endowed monasteries. The effect of such an association, under such a government, may easily be imagined. It has caused the establishment of numerous agrarian laws, the view of which has been to secure to the corporation of the Mesta, on their own terms, the whole produce of those lands, which are conveniently situated for the support of their flocks. Of these laws I have been able to learn only a few; but those few have been sufficient to authorize the conclusion, that they are equally contradictory, oppressive, and impolitic. Who, in this country, would believe that a proprietor of sheep pastures in those devoted provinces of Spain, is not allowed to inclose or cultivate them; and that, at the end of a lease, he cannot re-enter upon his own land, but is obliged under any circumstances of improvement, to relet it without advance, and frequently with a diminution of rent? But it would be fruitless to expect in Spain a voluntary dereliction of a system, which, while it enriches an indolent aristocracy, supplies the government with an annual revenue of from twenty-eight to thirty millions of reals, or nearly £360,000. sterling.

Under all these circumstances, it may be just matter of astonishment, that the Spaniards should so far have relaxed from that which appeared to be the policy of the rich and the great, as to have permitted, at various times, the exportation of their Merino sheep to different countries in Europe. Perhaps, however, this might have arisen from the influence of that prejudice, which has so long prevailed elsewhere, that the capacity of producing fine wool, even on their own breed, was exclusively confined to their own climate, soil, and mode of management. Of late years, their eyes seem to have been opened in this respect; and Bourgoing complains that

* Lasteyrie Traité, &c. page 131.

M. D'Aranda should have been so narrow-minded as to have observed, that, if his opinion had been followed, these exportations would never have existed.

These are all the important particulars which I have been able to collect from authentic sources respecting the nature, treatment, and produce of the Merino sheep in Spain.

CHAPTER III.

Origin of the Merino Breed of Sheep. By some attributed to England. Inquiry into the Quality of English Wool, Cloth, and Sheep, from the earliest Times to the latter End of the 17th Century. Merinos not derived from Britain. Not brought from Africa. Not existing in Spain in the Time of Strabo, Columella, or Pliny. Nature of the fine-woolled Sheep of ancient Italy. Coincidence of the Merino Breed with that Race. Probably a Colony of them, while Spain was a Province of Rome.

It is in vain that I have looked into authors for any plausible explanation of the name Merino, or any authentic history of the origin or introduction of the race itself.

The English, not deficient in a laudable conviction of superiority in the productions of their own country, have long asserted that this breed was either derived from England, or, at least, was greatly improved by the admixture of some English variety; which they do not hesitate to say was the Cotswold.

This opinion seems to be chiefly founded, first, on the supposed and boasted pre-eminence of English wool, which, from a very early period of our history, caused it to be sent in great quantities to the continent of Europe, either in the raw state, or in the form of cloth; and, secondly, on the general prohibition of the exportation of sheep, and the specific permission to export them, on some occasions, as a matter of high favour, to other countries, and even to Spain itself.

There is no positive evidence that sheep existed in ancient times in this island. Julius Cæsar says, that it contained "pecoris magnum numerum." * Pomponius Mela also calls the Britons, "pecore et finibus dites." † Now the word "pecus"

* De Bello Gallico, lib. v. § xii. † De Situ Orbis, lib. iii. cap. vi.

is indiscriminately applied to neat cattle and sheep. Neither can any thing farther be learned from the expression of Julius Cæsar, that the inhabitants were "pellibus "vestiti,"* clothed in skins; because the word "pellis" includes the skins not only of various quadrupeds, but even of man. It is certain, however, that the word "pecus," when used without a distinctive adjective, if it does not, as in the motto of this Treatise, mean sheep alone, is most usually designed to comprehend them; notwithstanding which, if the Britons at that time had sheep, as is most probable, we do not know that they either fabricated their fleeces into clothing, or sent them for that purpose to any other part of Europe.

Pennant asserts, I have not examined on what authority, that "from the Gauls "of the continent the Britons received the first cloth; the dress called the Bracha, "a coarse woollen manufacture."†

The same priority of export as to wool itself, is by Polydore Virgil given to the French; for which reason English wool in his time, in Italy, was called French wool, as if grown in France.‡

At a later period of the Roman empire, than those to which I have before alluded, Eumenius, the panegyrist of Constantine the Great, celebrates the natural advantages of Britain in terms of the most extravagant commendation. Among various other privileges, he assigns it that of containing "an innumerable "multitude of tame animals, distended with milk, and loaded with fleeces." "Pe-"corum mitium innumerabilis multitudo lacte distenta, et onusta velleribus."§

On this panegyric it is observed by the eloquent Gibbon, that "the orator Eume-"nius wished to exalt the glory of the hero Constantius with the importance of the "conquest. Notwithstanding our laudable partiality for our native country, it is "difficult to conceive that in the beginning of the 4th century, England deserved "all these commendations. A century and a half before, it hardly paid its own "establishment."‖

It is noticed by Camden,¶ that the Romans had an established cloth manufactory at Winchester. That author, however, himself lays no stress on the supposed

* De Bello Gallico, lib. v. § xiv.

† Pennant's London, page 2. I know not any proof that the "Brachæ Britonis pauperis" (Martial) were made of woollen cloth.

‡ Anglicæ Historiæ lib. i. page 13.

§ Panegyr. Vet. vii. 9.

‖ Decline and Fall of the Roman Empire, I. 432.

¶ Britannia Gibson, page 113.

fact, which seems to have arisen from a false interpretation of the Latin word Cyncgium, and of which there is, otherwise, no proof. It is, nevertheless, highly probable, that, during the continuance of our subjection to Rome, the more useful improvements of that empire were gradually introduced among us, and, with others, that of drapery, so conducive to the health and comfort of mankind.

The means of supporting these arts seem, however, to have been lost, as our country became harassed by the reiterated incursions of fierce and barbarous invaders. Some time after the beginning of the 8th century, we find the laws of Ina estimating a ewe with her lamb at one shilling from a fortnight after Easter, and the fleece at two-pence.* As, therefore, the pound then contained forty-eight shillings, and the shilling five pence, the value of the ewe and lamb, relatively to that of the fleece, was only as three to two. This is a most convincing proof of the scarcity of wool at that early period of our history.

In the reign of Æthelstan, some time between the years 925 and 940, an ox is rated at a mancus, or thirty denarii or pence, a cow at twenty-pence, and a sheep at a shilling, or five-pence. This proportion seems to shew that sheep were now far from abounding.†

As sheep multiplied, the country must have begun to feel the evil arising from the multitude of wolves which infested it; in consequence of which, in the year 961, King Edgar employed means which greatly reduced their numbers. They were not, however, then wholly extirpated; for in the year 1281, Edward the First issued a mandate to Peter Corbet for their destruction in the counties of Gloucester, Worcester, Hereford, Salop, and Stafford.‡

This was not the sole instance of attention shewn by Edgar to the culture of wool. In 974 we find him regulating its price, and directing that a wey—an uncertain quantity at this time—should be sold for half a pound of silver, or about thirty shillings of our money.

In the reign of Ethelred, A. D. 1000, a cow was sold at four shillings and four-

* Ovis cum agno suo valeat solido usque ad decimum quartum diem à Paschate. Leges Inæ, 55. Ovis vellus suum retinere debet ad mediam æstatem, vel solvat vellus duobus denariis. Leges Inæ, 69.

† Et bos mancusa, et vacca viginti denariis—et ovis solido digna sit. Judicia Civitatis Lundoniæ.

‡ Pennant's British Zoology, article Dog.

pence, and a sheep at five-pence; so that the latter was at somewhat more than one-fifth of the price of the former.* Sheep were therefore still comparatively scarce.

In the reign of Henry I. between the years 1100 and 1135, there was a more extraordinary disproportion. An ox was valued at one shilling, and a ram or sheep at four-pence.† At this time, and probably from that of William the Conqueror till 1298, the 28th of Edward I. an actual pound weight of silver contained only twenty shillings; and the penny being still, as before, the 240th part of a pound, was $\frac{1}{12}$th of a shilling. The price of the sheep in this instance was therefore one-third of that of the ox. In another part of the same reign, certain sheep were six-pence each, or half the value of the above ox.‡

It was during the life of Henry I. that the Telarii, or weavers, of London and Oxford, seem to have been first distinctly mentioned in our records. They are represented in the Exchequer accounts as paying to the Crown fines for their guild or incorporation; which proves that they must at that time have been numerous.§

Those of Lincoln and Huntingdon are spoken of as paying similar fines in the 5th year of King Stephen, anno 1139, and those of Nottingham, York, and Winchester, in the 5th and following years of Henry II. annis 1158 et seq.‖

Henry the IId. appears to have been very desirous of increasing the breed of sheep, and of establishing the woollen manufacture in England. It was, probably, with this view, that, according to Stow, about the year 1172, he ordered that if any cloth were found to be made of Spanish wool mixed with English wool, the Mayor of London should see it burnt.

In 1184, the 29th of Henry II. 66 oxen are said to have been sold for £18. 3*s.* or 5*s.* 6*d.* each; and 500 sheep at $10\frac{3}{4}d.$ each; or the sixth part of the price of each ox.¶ The proportion of sheep was now, therefore, probably insreased; and nine years afterwards, wool was become so current a commodity of the kingdom, that a part of the ransom of Richard I. when a prisoner in Austria, during his return from the Holy Land, was wool borrowed from the Cistercian monks.

* Chronicon preciosum, page 64.

† Ibidem, page 69.

‡ Ibidem, page 71.

§ Madox, History of the Exchequer, page 232.

‖ Ibidem, page 233.

¶ Madox, Baronia Anglica, cap. xiv.

About the year 1197, the 9th of Richard I. woollen cloths were ordered to be all of one breadth, that is, two ells within the lists.*

In 1198, Hugh de Bosco, Sheriff of Hampshire, stocked the king's lands with 12 oxen, each at 3*s.* and 100 sheep, at 4*d.* each.† A sheep was now, therefore, reduced to one-ninth of the value of an ox. Whether this arose from the relative increase of sheep, or diminished demand for wool, it may be difficult to decide; but we find that in this and the following year certain merchants paid fines to the Crown through Gervase de Aldermanbery, Chamberlain of London, for leave to export wool and leather.‡ This, I think, is the first authentic document of the exportation of wool from England.

From this period the manufacture of cloth seems to have declined, or, at least, is little heard of through several successive reigns. About the year 1272, the number of weavers in Oxford was, from the decay of trade, reduced from upwards of 60, which they had been in the time of Henry I. to less than 15; in consequence of which, King Edward I. diminished the annual fine of the corporation of weavers in that city, from a mark of gold, or 120 shillings, to 42 shillings.§

It was not till more than a century after the first declension of the cloth manufacture in England, or about the year 1301, that, in consequence of various restrictions on those of Brabant and Flanders, riots of a bloody kind took place, and many workmen emigrated to this country, where they were protected and liberally employed.‖

During this whole period, wool was sent out of England, chiefly to Italy and the Netherlands, and cloth imported. Of the quantity of the former some notion may be formed from the accounts delivered in to the Exchequer in the year 1281, the 10th of Edward I. by Bonricini Guidiconi and his companions, merchants of Lucca, who were the receivers and bankers of the royal customs on exported wool, wool-fels, and leather. From these it appears, that, at half a mark, or 6*s.* 8*d.* per sack on wool, the same for every 300 wool-fels, and one mark for every last of leather, the sum collected in one year amounted to £8440. 19*s.* 11$\frac{1}{2}$*d.* In Madox, from whom I quote, the proportion of the several articles in this account is specified for the port of Newcastle upon Tyne only; but if that proportion may

* Anderson's Deduction of Commerce, anno citato.

† Madox, Exchequer, page 643.

‡ Ibidem, page 532.

§ Ibidem, page 232.

‖ Anderson, anno citato.

serve as a rule for the rest, the custom on wool alone was £6717.* What the weight of the sack was at this time I do not exactly know. I believe it was not till the reign of Edward III. that it was ordered by law to contain 26 stones of 14 lbs. to the stone, or 364 lbs. If we take it at that weight, the number of sacks exported would be 20,151, and the wool 7,334,964 lbs.

This may seem a large quantity. It must, however, be recollected, that almost all the garments of both sexes in England, and, probably, in other parts of Europe, were then made of wool. Now if only $2\frac{1}{4}$ lbs. of wool, as washed on the sheep's back, were required to form a yard of cloth, the number of yards thus made would be 3,259,984; and if 5 yards be allowed for the annual clothing of one man, the quantity which I have stated would be only sufficient to clothe 651,997 persons.

From the writings of De Witt it appears, that the woollen manufacture was established in Flanders as early as the year 959;† nearly 240 years before we know of any exportation whatever of wool from Britain, and almost 300 before any specific notice of such an exportation to the Netherlands, which did not take place till somewhat before 1252. The Flemings must, therefore, during that long period, have been abundantly stocked with wool, independently of any supply from this island.

If, before 1252, we furnished foreign countries with little wool, much less were we able to export cloth. All our efforts to produce that necessary article in sufficient quantity for our own consumption were evidently ineffectual. Accordingly we find, that, in the 30th year of Henry III. anno 1245, Simon de Campis, of Douay, is allowed to bring his cloth, duty-free, to any part of the realm.‡ In fact, the superior skill of foreigners, and more especially the Flemings, enabled them to sell in our markets woollen goods of a given quality at a lower price than they could be furnished by our own manufacturers; on which account these foreigners became so obnoxious to our workmen, that, on various subsequent occasions, it became necessary to protect them by the strongest proclamations,§ the violation of which was often followed by the infliction of very severe penalties. So great indeed was the superiority of skill or industry in the Flemings, that it was not counterbalanced either by the original expence of the raw material itself, loaded with the custom payable on it to the Crown, or all the charges of its first transpor-

* History of the Exchequer, page 634.

† Anderson, anno citato.

‡ Ibidem, page 526.

§ Rymer's Fœdera, V. 429.

tation across the sea, and its return in form of cloth. Thus a considerable proportion of the inhabitants of England was, in those times, arrayed in the produce of their own soil, manufactured in the Netherlands; just as, at this day, the Spaniards are clothed with their own wool manufactured in Great Britain.

In 1296, Edward, in a treaty with the Flemings, gave them formal liberty to buy and transport from his territories wool and other articles of merchandize;* but, in order to supply the expences of his war with France, he, with the concurrence of the Commons, raised the custom on exported wool to forty shillings per sack. A truce, however, taking place during the same year, he listened to the remonstrances of the commonalty, and reduced the custom to half a mark per sack,† which it seems to have then for some time been, originally by grant of Parliament. From this period, the custom of 6*s.* 8*d.* on each sack of exported wool was, through several succeeding centuries, constantly claimed by the Crown as a right; though it afterwards suffered several modifications, either by the will of the sovereign, or the voluntary grant of the people.

It is, however, impossible that British wool could at this time have been in great estimation among the Flemings, comparatively with that which they had been accustomed to use; for, in 1298, only two years afterwards, and the same distance of time before the riots which caused many of their workmen to take refuge in England, the demand for sheep was so small, that, while at Scarborough an ox was valued at 6*s.* 8*d.* a sheep was one penny, or only an eightieth part of the price of the ox.‡

The arrival of the Flemish manufacturers, who not only brought with them their superior knowledge, but probably a part of their capital, seems to have restored

* Anderson, anno citato. † History of the Exchequer, pages 536, 537.

‡ Chronicon preciosum, page 82. It is curious that about this time, 1297, according to Hume, the discontented barons should have complained to the king of his "violent seizure of "wool, a commodity which they affirmed to be equal in value to half the lands of the kingdom." This hyperbolical language might serve well enough for the declamation of a high-spirited and patriotic chieftain, but cannot be admitted as the basis of the cooler deductions of the politician. The soil was certainly worth as much as the sheep which it supported, and, for 600 years, the fleece had never been worth half the sheep which produced it. Whence, also, were derived the grain and other vegetable aliments of the horses, beeves, hogs, poultry, game, and human inhabitants of the land? Whence its timber, medicinal and dying drugs, minerals, and a great variety of other produce?

sheep to greater estimation; for, according to Dugdale, in 1302, a cow sold for 6*s.* 8*d.* a fat mutton (wether) for a shilling, and a ewe-sheep for eight-pence; or from about one-tenth to one-seventh of the price of the ox.*

Till this period there is nothing in the history of England or of the continent, which can in the slightest degree justify us in concluding that our wool was considered as possessing peculiar merit.

In 1302, a new æra seemed to arise. Edward the First and his Parliament established the great charter of merchandize, called Charta Mercatoria, in which they permitted all foreign merchants to sell their goods in England, under certain restrictions and customs, and to export scarlet and other dyed cloths, wool-fels, and wool; the last article at 40*d.* per sack, over and above the old custom of 6*s.* 8*d.* The Charta Mercatoria was republished and confirmed in several subsequent reigns, as those of Edward III. Richard II. Henry IV. and Henry V.† and tended to establish the claim of the customs, which, without that authority, our monarchs would indeed have been sufficiently averse to relinquish.

Besides this custom, as the exigences of the state increased, more especially for the support of foreign wars, the Parliament on various occasions granted subsidies, of which nothing afforded so sure and extensive a basis as wool. These subsidies were almost universally laid only on wool exported; and amounted to from 30*s.* to £5. per sack, usually over and above the old custom of 6*s.* 8*d.* They were in general considerably higher for wool exported by aliens than by natives or denizens. As the home manufacture increased, they were extended to cloth as well as wool; and, from the time of Henry the Eighth, came to be comprehended under the general head of tonnage and poundage.

Large sums were in this way raised; but the sovereigns, by their own authority, occasionally remitted these imposts in favour of particular persons or countries. Nor did they, sometimes, hesitate totally to prohibit the exportation of wool and cloth. But these resolutions were of short duration, having always in view the gratification of some temporary animosity, or the acquisition of some pecuniary emolument. It was not till 1647, the year before the decollation of the unfortunate Charles the First, that the Parliament seriously and on principle interdicted the exportation of wool; a resolution which was finally confirmed by

* Chronicon preciosum, page 83.

† Rymer's Fœdera, IX. 72. Anderson, anno 1302.

King, Lords, and Commons, soon after the Restoration of Charles the Second in 1660.

Notwithstanding the custom probably laid on imported cloths by the Charta Mercatoria, we find our merchants, at the beginning of the fourteenth century, still complaining that they were undersold by strangers.*

The woollen manufactures of Flanders and Brabant had now reached to an astonishing height; so that it seems as if they could with difficulty supply themselves with the basis of their numerous and various fabrics. They very readily, therefore, availed themselves of the vicinity of England to provide themselves with a commodity, which was so essential to their own prosperity; and from this time we find those two countries out-bidding each other for the preference in our markets, which was occasionally granted to one or the other, as the temporary interest of our people, or, sometimes, of our sovereign, appeared to dictate.

In the year 1314, the 6th of Edward the Second, a corn-fattened cow was ordered, by royal mandate, to be sold at Oxford for twelve shillings; a corn-fattened ox for twenty-four shillings; a fat corn-fed mutton, unshorn, for twenty-pence, and shorn, for fourteen-pence.† This decree was soon after confirmed by Parliament for the whole island. Hence it appears, that the value of the fleece was three-sevenths of that of the carcase. Either, therefore, sheep must have been extremely plentiful, or wool in great request.

The great and increasing prosperity of the Netherlands, arising from their extensive woollen manufacture, excited the envy and emulation of the neighbouring states. The abundance of our raw materials naturally led us to be among the first to enter into the competition. With this view, our kings, in subsequent periods of our history, and more especially Edward the Third, took the greatest and most laudable pains to invite from other countries persons most skilled in all the arts of drapery. The success of these efforts was much promoted by the discontents among the clothiers in the Netherlands, whom either the wantonness of wealth, or the tyranny of their rulers, prompted to frequent insurrections, or actual rebellions, followed by battles and numerous emigrations. Edward, who labours under some suspicion of having fomented such disturbances, received these emigrants with open arms, and protected them against the animosity of our countrymen,

* Anderson, anno 1302. † Chronicon preciosum, page 89.

jealous of their superior skill. Thus the balance of trade soon turned in favour of England.

It is chiefly from this period that our historians date the evidence of the superiority of our wool to that of other countries.

The export of wool soon greatly increased; and in 1338, the 12th of Edward the Third, the king issued a proclamation to prevent the exportation of live rams from the port of St. Botolph's.*

Two years afterwards, the best wool, that of Salop, sold for £6. 6*s*. 4*d*. the sack of 364lbs.† At this time the nominal pound was a real pound weight of silver, divided into twenty nominal shillings and three-pence; so that the standard, or proportion of silver to the alloy, being the same as at present, each shilling was equal to about 2*s*. 10$\frac{1}{4}$*d*. of the present coin. The sack of 364 lbs. was therefore worth £18. 0*s*. 7*d*. of our money; which was about £11. 17*s*. 8*d*. for our pack of 240 lbs.

About this period we had acquired so much skill in the manufacture of cloth, that Edward, who had quarrelled with the Flemings, and debarred them from the supply of English wool, ventured to forbid his subjects the use of any cloths but such as were made in the country; reserving, however, to himself and his family, the privilege of indulging themselves in foreign and better fabrics.‡ These prohibitory edicts were soon repealed.

In 1343, the lowest price of all the wools in the kingdom was fixed by act of parliament. Among these, all the wool of Salop and Lincoln was ordered to be sold for at least 14 marks, or £9. 6*s*. 8*d*. per sack; the best of Oxford and Stafford at 13 marks, or £8. 13*s*. 4*d*.; all Leicester and the best of Gloucester and Hereford at 12 marks, or £8. &c.; and Devon and Cornwall, which were the two worst, the former at £3. and the latter at 4 marks, or £2. 13*s*. 4*d*. per sack.§ At this time the pound of silver, which, as I have before observed, always contained twenty shillings by the tale, was divided into 22*s*. 6*d*. The shilling was therefore equal to 2*s*. 7*d*. of our present coin. The Salop and Lincoln wools were, therefore, at £24. 2*s*. 2*d*. of our money per sack, or £15. 17*s*. 10*d*. the pack; the

* Rymer's Fœdera, V. 36.

† Smith, Memoirs of Wool, Vol. I. page 22.

‡ Anderson, anno 1337.

§ Rymer's Fœdera, V. 369.

Leicester and the best of Gloucester and Hereford £20. 13*s.* 4*d.* or £13. 12*s.* 6*d.* per pack; and so of the rest.

In the same proclamation, the wool of Holland is rated at 11 marks, or £7. 6*s.* 8*d.*; or £12. 9*s.* 9*d.* of our money per pack. This is exactly the same value as was assigned to our wools of Northampton, Bucks, Bedford, Somerset, and the best of Yorkshire. The best Lana de Marisco, by which is meant wool that had come through the Streights of Gibraltar, then called the Streights of Morocco, is directed to be sold at the same price.

Relatively to this period, a letter, said to be written from Medina del Campo in 1437, gives the following account; which I copy from my excellent friend Sir Frederic Eden's valuable Collections on the State of the Poor:

"The Council appointed Gomez Carrillo to go to the Admiral, and the King "had named Juan Sanchez de Tovar; and it was debated which of them should "go; and warm speeches passed between Fernan Sanchez de Berlanga, and "Pedro Laso de Mendoza, son of Inigo Lopez; one of them being related to "the one, and the other to the other. Pedro Laso said, in the king's presence, "that Gomez Carrillo was son to one of the king's gentlemen or pages, and "grandson to King Don Enriques' chief cup-bearer, who was son of Lope Car-"rillo, gentleman and chief huntsman of Don Juan the First; and that he was "not son of a judge over shepherds. This was said as a sneer; for Juan Sanchez "de Tovar is descended from Fernan Sanchez de Tovar, judge of the royal flock "of sheep and folds. F. S. de Berlanga answered, in the king's presence, that he "understood the sarcasm, but that it was ill aimed, and might be retorted upon "himself; for that J. S. whom he reproached as a judge over shepherds, was his "equal; that the office of judge and alcayde of the royal flocks was always held "by gentlemen of rank. That King Alfonso, when he first brought sheep from "England by sea in great ships (in naves carracas) appointed Inigo Lopez de "Orozco to be the first person to begin to exercise that office; from whom Pedro "Laso himself was descended on the part of his mother: and now being informed "that himself was descended from a judge over shepherds, he might mock at his "pleasure." King Alfonso the last died in the year 1350.*

It is an evidence of increasing manufacture, about the year 1347, that shortly before that time a custom of fourteen-pence had been laid on every white cloth,

* Vol. I. page 88, note.

and ten-pence on every Lit, or dyed cloth, exported by native merchants; and twenty-one-pence and fifteen-pence respectively, by strangers. The plea for this impost was to maintain the revenue from wool in every form; "rateable the cloth "as the sack."*

In the next year, Edward the Third made Calais, then in our possession, the staple or market for wool and other exported English wares; and also for worsteds, stuffs, and other cloths, brought from other countries. Worsteds seem to have been at that time but recently spoken of;† and it was probably the introduction of that manufacture from the continent, which then began to make the Lincoln wool equal in value to the Shropshire.

In the year 1354, the 28th of Edward III. a subsidy was granted him for six years on all the wool sold in the kingdom; or, according to Sir Walter Raleigh, on all exported wool. This subsidy, at 50 shillings per sack, is said to have amounted to 850,000 marks per annum; which makes the quantity of wool 93,333 sacks, or 141,555 packs of 240lbs. each.‡

From an account said to have been delivered to the Exchequer in the same year, it appears, that the quantity of cloth exported was $4774\frac{1}{2}$ pieces, at 40 shillings value per cloth; and the quantity imported 1832 cloths, at £6. value each.§ This comparison is not very creditable either to our wool or manufacture.

In 1380, the 4th of Richard the Second, a riot at Louvain caused many of its manufacturers to settle in Holland and England.‖

In 1390, the 14th of Richard the Second, the quantity of exported wool was

* Anderson, anno citato. Smith, I. 25.

† Rymer's Fœdera, V. 618. Worsteds were called by the Flemings, "Ostades;" and as that manufacture was in their hands long before it was introduced into England, it is probable that our appellation is a corruption of theirs. Ostade was long ago a common surname in Flanders; and perhaps was that of some person famous for this particular branch of the woollen trade, which afterwards was appropriated to an establishment of similar manufacturers in Norfolk. So the word "Blanket," which meant a particular kind of white, coarse, undressed cloth, was perhaps derived from Thomas Blanket of Bristol, who is recorded as being, in the year 1339, one of the first who set up the manufacture of cloth in their own houses, when the exportation of wool was for temporary purposes prohibited. "Grogram" is nothing more than "Gros grain;" "Camelot à gros grains," or coarse grained camblet, in opposition to another sort called "Fin-"grin;" or fine-grained.

‡ Smith, I. 32. § Ibidem, I. 31. Anderson, 1354. ‖ Ibidem, 1380.

much diminished, comparatively with what it had been thirty-six years before. The subsidy and custom, making together 46*s.* 8*d.* per sack, amounted to £160,000.; which shewed the whole export to have been 68,571 sacks, or 103,999 packs. This difference does not seem to have arisen from any increase of our manufacture, but is by Knyghton attributed to a prohibition of exporting wool by natives, and to a mandate to them to carry it to twelve places within the realm, in order to its exportation by strangers.*

In consequence of the improvement in the fabric of cloths, Henry the Fourth in 1399, the first year of his reign, prohibited the importation of all foreign cloths;† a prohibition which was afterwards on various occasions relinquished.

In a treaty made with Flanders in 1408, we find Henry permitting commerce between England and that country, on which, he says, the sustenance of the latter is founded, and more especially on drapery. This benefit is afterwards said to be reciprocal; and must surely have meant much more than the mere export of wool from England.‡

According to an authentic record, the customs on exported wool in 1421, the 9th of Henry the Fifth, amounted to £3976. 1*s.* 2*d.* the subsidy to £26,035. 18*s.* 8½*d.*§ Now if the custom were 6*s.* 8*d.* the sack, the number of sacks exported would be 11,928. And if we reckon by the subsidy, which for natives and denizens was probably 43*s.* 4*d.* and for strangers 53*s.* 4*d.* with an abatement of 6*s.* 8*d.* per sack, in both cases, as in the 6th year of Henry the Fourth, the average will be 41*s.* 8*d.* per sack, and the whole number of sacks 12,497. The latter quantity is certainly over-reckoned, because the greater part of the wools of the kingdom were shipped by strangers, on whom the subsidy was greatest. The agreement of the results is, however, sufficient to shew that the quantity exported in that year did not exceed 12,000 sacks, or 18,200 packs of 240 lbs. At this time, therefore, though we were at peace with all the world, the exportation of wool appears to have been very much diminished, probably in consequence of the increase of our own manufacture.

In the year 1424, the 3d of Henry the Sixth, a law was made prohibiting the exportation of live sheep from England without leave of the Crown, except to Calais, for the purpose of victualling that place and its Marches, under pain of forfeiting the sheep.‖

* Knyghton, inter x Scriptores, pag. 2737. † Anderson, 1399.

‡ Fœdera, VIII. 530. § Ibidem, X. 113. ‖ Anderson, 1424.

Hackluyt, in his Collection of English Voyages, has a Poem called " The Libel " of English Policie, exhorting all England to keepe the narrowe Sea;" the beginning of which appears to have been written before the year 1438, and a subsequent part after 1449. In the first chapter the writer says,

" But, Flemings, if yee bee not wroth,
" The great substance of your cloth at the full,
" Dee wot ye make it of our English woll."

And again,

——————— " the wooll of England
" Susteineth the commons Flemings, I understand."*

The last sentiment, and even the words themselves, evidently allude to the treaty of the 9th of Henry IV. above quoted. But surely it must be allowed that the sustenance of the Flemings must have been very meagre, if, as this author restricts the sense, it were founded on the annual manufacture of 18,200 packs of English wool. Besides which, it must be recollected, that a part of this very quantity went to the numerous towns in the great Hanseatic Confederacy, and part to Genoa, Florence, and Venice. In confirmation of this opinion, we find, that, in 1438, leave is given for the agent of the King of Portugal to export for his use to Florence sixty sacks of Cotswold wool, in order to procure, in return, certain cloths of silk and gold for that king.†

In the course of our history it frequently happened that our monarchs, having borrowed money of the Lombards, or other wealthy persons, repaid them by granting them in advance so much of the custom and subsidies next due, as should be sufficient to liquidate the debt. In order the more readily to obtain such loans, they not only sometimes connived at various acts of extortion in these creditors, but occasionally dispensed with the laws which confined she sale of commodities to particular ports. Indignant at this conduct, the Parliament, in the year 1448, the 27th of Henry VI. passed an act, in which they complain that the subsidies and customs of the staple of Calais, which in the reign of Edward the Third amounted to £68,000. did not now exceed £12,000.; for which reason they decree, that no license granted or to be granted by the king shall be available for the carriage of wool, &c. to any place out of the realm, but Calais.‡

* Vol. I. page 188. † Fœdera, X. 684. ‡ Anderson, 1448.

It is, however, probable that a part of this deficiency arose from the increase of the manufacture, which, either for foreign or domestic use, more profitably consumed the raw materials. This is confirmed by an event which took place that very year; which was the refusal of the governments of Brabant, Holland, and Zealand, to receive our cloths; in consequence of which, all merchandize from the dominions of the Duke of Burgundy was prohibited in England.* These reciprocal prohibitions, which did not extend to the Flemings, were, as usual, soon revoked.

The loss of revenue from the diminished export of wool, added to the increased demand for our cloths, induced our Parliament in 1452, the 31st of Henry VI. by way of compensation to the Crown, to raise a subsidy on all cloths exported; † and in 1463, the 3d of Edward IV. in consequence of various complaints from our manufacturers, Parliament forbad the importation of woollen caps, woollen cloths, and a great variety of other articles. ‡

In order to establish this important point, a new act was passed the following year, the preamble of which recites, "that whereas the workmanship of cloths and "other woollen goods was become to be of such fraud and deceit, as to be had in "small reputation in other countries, to the great shame of this land; and that by "reason thereof great quantities of foreign cloths are imported and sold at high "and excessive prices, &c." §

In the same year, according to many of our historians, Henry IV. of Castile and Leon was permitted to import into his dominions live sheep from the Cotswold hills in Gloucestershire. These sheep, according to Trussell, were 5 rams and 20 ewes. In 1468, the same privilege is said to have been granted to John King of Arragon. ‖ To these importations popular opinion in this country attributes the origin of the Merino sheep in Spain.

In 1480, Edward the IVth, in a proclamation which is preserved in the Fœdera, allows his sister Margaret, Duchess Dowager of Burgundy, to export yearly during her life, to any part of Flanders, Holland, and Zealand, 1000 oxen and 2000 rams. ¶

Ten years afterwards, we engaged to supply Florence, in English vessels, with all the wool wanted by the Italian states, except 600 sacks to Venice. **

* Anderson, 1448. † Ibidem, 1452. ‡ Ibidem, 1463. § Ibidem, 1464.
‖ Ibidem, 1464 and 1468. ¶ Fœdera, XII. 137. ** Ibidem, XII. 390.

In the year 1534, the 26th of Henry VIII. the profit arising from sheep, comparatively with other modes of applying land, was become so great, that various individuals possessed from 5000 to 24,000 each; in consequence of which, Parliament, attributing thereto the dearness not only of corn, but of sheep and wool, enacts, that no one shall keep, at any one time, more than 2400 sheep, exclusively of lambs, except on his own lands of inheritance, and except spiritual persons; in both which cases there is no limitation.*

It is said by Rapin and others, that in the year 1551, the 5th of Edward VI. 44,000 woollen cloths were exported from England by the merchants of the Stillyard only; and, probably, a much greater number by other persons.

The reputation of England for its native wool was now approaching its greatest height. We are informed by Lodovico Guicciardini, who wrote the history of the Low Countries in 1560, that, at this time, there were annually exported from England to Bruges, then the staple of the commodities of this island, 1200 serpillieres of wool of various sorts and prices, amounting, on the whole, to at least 250,000 crowns per annum.† Having not been able to procure the original Italian, I quote from the French published by Plantinus, at Antwerp, in 1581, under the immediate direction of the author, and revised and augmented by him. The word Serpilliere does not mean a sack of 364 lb. as is usually supposed; but the Sarplarium of our ancient records, called in English a Sarple, or Surple. In Rymer's Fœdera, among the seizures of wool in the various counties of England in the year 1341, the 15th of Edward III. for the ransom of Henry of Lancaster, Earl of Derby, then a prisoner, we find it directed that, in the county of Leicester, a seizure should be made "de "triginta quatuor Sarplar. tribus Saccis, et viginti duobus Petris;" ‡ thirty-four sarples, three sacks, and twenty-four stones. These are different denominations of quantities, the whole of the third of which must be less than one of the second, and the whole of the second less than one of the first. So if we should say thirty-four hundred, three quarters, and twenty-seven pounds, we shew that more than twenty-seven pounds are contained in one quarter, and more than three quarters in one hundred. By the same rule, a sarple must have been, at least, four sacks; and the

* Anderson, 1534. This law is still in force. Burn's Justice. Great and enviable were the privileges of those higher orders in the early periods of our history. In the 22d year of King Edward IV. Parliament graciously accords them the exclusive right nates et genitalia detegendi.

† Description de tous les Païs Bas, page 195. ‡ Fœdera, V. 248.

whole 1200, 4800 sacks of 364 lbs. or 7280 of our packs of 240 lbs. Now as the escu, or crown, was worth about four shillings and one penny of our money, and the whole amount was 250,000 crowns, or £50,000. the value per sack was £10. 8*s*. 4*d*. and per pack £6. 17*s*. 4*d*.; that is, of our present money, the sums of £51,041. 13*s*. 4*d*. £10. 12*s*. 8*d*. and £7. 0*s*. 2*d*. respectively.

This wool was surely of low price, and the quantity inconsiderable; but, on the other hand, the same author informs us, that the woollen cloths of different sorts annually sent from England to Antwerp could not be fewer than 200,000 entire pieces, worth, at least, 25 crowns, or five pounds two shillings and one penny each.* These cloths were probably of very various kinds; of which the broad-cloths, from before this period till the beginning of the following century, were chiefly exported undressed and undyed. The comparative value of some of them must, however, have been very considerable, as we are told by Guicciardini that they were sent from Antwerp to Germany as a thing rare and of high price: "Comme chose rare, et de hault pris."†

In the year 1601, the 44th of Queen Elizabeth, according to John Wheeler, Secretary to the Society of Merchant Adventurers, there were annually shipped out of this country by that company only, exclusively of wool and wool-fels, 60,000 white cloths, worth £600,000. sterling; and 40,000 coloured cloths of all sorts, baize, and kersies, worth £400,000.‡

At this period the aggregate commerce of England, in exported wool and cloths, had reached its greatest extent; and in this state it continued twelve or fourteen years, till Sir William Cockayne, Alderman of London, had the address to persuade our government to prohibit the exportation to Holland of our cloths undyed and undressed; in consequence of which, the Dutch and Germans, who had before completed those processes, absolutely refused to receive them.§ Hence only 64,000 cloths are said to have been exported in 1616; and in the year ending Christmas 1622, all the imports into England, custom, &c. included, amounted to - - - - - - - £.2,619,315 0 0

and all the exports, including customs, taxes, merchants' profit, and all other charges, to - - - 2,320,436 12 10

Giving a balance against us of - £. 298,878 7 2‖

* Guicciardini, page 195. † Idem, page 186. ‡ Smith, I. 84.
§ Smith, I. 102. ‖ Anderson, 1622.

The account which I have so far given of the progress of the manufacture of cloth, and of the state of the wool, in England, will, I believe, be found very accurate, and certainly shews that both those commodities were for nearly three centuries in considerable esteem through a large part of Europe. What superiority these and other facts tend to establish in our wool over that of Spain, so as to justify the conclusion that the Merino breed of sheep originated in England, we have still to enquire.

I have related above the mandate of Henry the Second to the Mayor of London in 1172, to burn any cloths made of Spanish wool mixed with English wool.

The Charta Mercatoria, established in 1302, permits the merchants of Spain, among others, to come to the dominions of the king, and freely to sell their goods. That charter, as I have before observed, was renewed in several successive reigns; and treaties of commerce and friendship between England and one or both of the two kingdoms of Castile and Arragon were agreed on in 1308, 1317, 1325, 1353, 1403, 1404, 1410, 1416, 1418, 1464, 1468, 1482, 1483, 1490, 1515.*

So also in 1337, Edward the Third, then at enmity with the Flemings, entreats Alfonsus the Eleventh, King of Castile, to prohibit his subjects to carry their merchandize to Flanders, but rather to send his ships and cargoes to England, where he promises them protection.†

On none of these occasions is any thing said of the importation of Spanish wool; nay, so little jealousy did we then entertain of that commodity, that, in 1340, the quarrel with the Flemings having been accommodated, Edward granted his protection to the merchants of Spain, Catalonia, and Majorca, coming with their ships, goods, and merchandize, to the ports of Brabant and Flanders.‡

In the treaty of commerce with the King of Arragon, in 1353, his subjects, the Catalonians, are specifically permitted to resort to England, in order to buy wool, leather, and lead.§

The "Libel of English Policie," quoted above from Hackluyt, has in it an express comparison between the wools of Spain and England, in which the preference is given to the latter, though the former is said to have been always a great export of Spain, and constantly carried to Flanders and manufactured there:

* Fœdera, passim; &c. † Ibidem, IV. 736. ‡ Ibidem, V. 179.
§ Ibidem, V. 762.

" The woolle of Spaine it cometh not to preeffe, (proof)
" But if it be costed and menged (mingled) well
" Amongst the English wolle the greater delle.
" For Spanish wool in Flanders draped is,
" And ever hath bee; that men have minde of this.
" And yet wooll is one of the chief marchandy
" That longeth to Spaine: whoso will espie,
" It is of little value, trust unto mee,
" With English wooll but if it menged bee."

This Spanish wool is, in the Preface, said to have been carried to Bruges, where we know the market for it existed two centuries afterwards.*

In 1470, certain Spanish ships bound for Flanders were taken by English pirates. The owners complained to Henry the Sixth, that the wool, which formed a part of their cargoes, would have yielded in Flanders four pounds sterling the sack of one quintal and three quarters.† Now if we take for a standard the present weight of Cadiz, which is to ours as 109 to 105, 175 lbs. will be $181\frac{1}{2}$ lbs. for the Spanish sack. This quantity, at £4. would be equal to 364 lb. for about £8.; which sums, the pound of silver being at that time divided into thirty-seven shillings and sixpence, and, of course, the shilling being worth 1*s.* $7\frac{3}{4}$*d.* of our present coin, would at this day be equivalent to £6. 11*s.* 8*d.* and £13. 3*s.* 4*d.* This happened during the short restoration of Henry the Sixth, after numerous sanguinary combats, which had wasted the people, and so far diminished the demand for manufactured goods, that various cloths, which, in 1514, sold for £6. each, are said to have been worth only 40*s.* in the time of Edward the Fourth.‡ Our wool must doubtless have been proportionably cheap; but I can find no actual authority for its value at any nearer period than 45 years before, when England had peace at home, or 64 years afterwards, when our manufactures of all kinds had been greatly improved, and were proportionably demanded. This incident, therefore, on which some authors have laid great stress, affords no just grounds of conclusion.

If to these facts we add those which I have stated above, relatively to the supposed exportation of our sheep to Spain, I believe that, notwithstanding the pertinacity of our countrymen, we shall find no others which can furnish the slightest suspicion that the Merino breed was derived from England.

That Spain itself abounded with sheep at the very commencement of what by

* Hackluyt, I. 187, 188, 189. † Fœdera, XI. 671. ‡ Anderson, 1512.

historians is called the middle age, cannot be doubted. In less than one hundred years from the beginning of the seventh century, when Mahomet fled from Mecca to Medina, the Saracens, his followers, extended themselves into Spain, which, in 714, they made great progress in taking from the Goths, and, in two or three years, totally over-ran. At this period, in the quaint words of Roderic, Archbishop of Toledo, it was "fruitful in corn, pleasant in fruits, delicious in fishes, savoury "in milk, clamorous in hunting, gluttonous in herds and flocks,"* while in England, as we have before seen, sheep were so scarce, that a fleece was estimated at two-thirds of the value of the ewe, which produced it, and the lamb put together.

Into Spain the invaders either carried with them the arts of luxury, or acquired and improved them there; so that the revenue of one of their sovereigns in the 10th century amounted to six millions sterling—"a sum, which probably at that "time surpassed the united revenues of the Christian monarchs."† And when, after several centuries, they were in their turns gradually expelled by their Christian neighbours, their country saw nothing but the change of religion, which could compensate for the loss of population, of agricultural and mechanical science, industry, and wealth. On the recovery of Seville from the Moors by Ferdinand the Third, in 1248, not less than 16,000 looms are said to have been found in that city.‡ Of these machines, the far greater number was probably employed in the fabric of woollen cloths. Thus, according to Ustariz, "the manufactures of Segovia flou-"rished most, both in point of number and quality, and were in high esteem, being "the best and finest that were known in ancient times."§ These fabrics, the temperature of the climate, and the luxurious propensities of the inhabitants, would indeed naturally determine to be of the lightest and softest kinds. Hence in the midst of all our boast of manufacture, and of various treaties from the time of Edward the Second to that of Elizabeth, we read of only two or three instances of the

* Fœcunda frugibus, amœna fructibus, deliciosa piscibus, sapida lacticiniis, clamosa venationibus, gulosa armentis et gregibus. De Rebus Hispaniæ lib. III. cap. xx. Apud Beli Scriptores. He wrote in 1243.

† Gibbon's Decline and Fall of the Roman Empire, V. 381.

‡ Ustariz, Theory and Practice of Commerce. English edition, I. 24. Townsend's Travels in Spain, Vol. II. page 332.

§ Ustariz, II. 281.

importation of English wool or cloth into Spain. The Spaniards had then, certainly, on their own soil the breed, the fleeces of which were best adapted to their own taste and climate; and that breed was probably the Merino.

We are told by Rodericus Santius, Bishop of Palentia, that there was then in Spain "such abundance of animals, herds and flocks of sheep, that many thousands "were killed for their fleeces and hides only." "Animalium quoque et armen-"torum, sed et pecudum tanta copia est, ut plerunque ob vellera atque coria multa "millia occidantur."*

Of the skill of the Spaniards in the manufacture of cloth in early times, various proofs are afforded us by Dillon: "The woollen cloths of Barcelona," says he, "were in high esteem in Seville in King Peter's reign, and in the preceding cen-"tury. So far back as 1243, the woollen cloth of Lerida is spoken of in terms of "great estimation. A few years after, the towns of Banolas, Valis, Gerona, Per-"pignan, and Tortosa, were remarkable as manufacturing towns, and for the fine-"ness of their cloths, fustians, and serges. So great was their exportation, that, "in 1353, on board of a ship from Barcelona bound to Alexandria, taken by a "privateer of Genoa, at the entrance of the Archipelago, among other articles they "found her cargo to consist of 935 bales of cloth of different colours. And in "1412, Antonio Doria, in the port of Callus, captured three Catalonian ships, "on board of which were found near one thousand bales of cloth, besides many "other valuable articles."†

At this time the superiority of the skill, if not of the raw materials of the Spaniards, seems to have been acknowledged by the English; for we are told by the same author, that, according to records still extant at Barcelona, of the date of 1446, considerable orders for wool were sent to England, in order to manufacture it in that city, and return it to England in form of cloth. The Spaniards themselves, it seems, disdained to wear it.‡

The tax of Servicio and Montazgo on the travelling flocks of Spain commenced in the year 1457.§

According to Lucius Marineus Siculus, who wrote in the reign of the Emperor Charles the Fifth, some time after the year 1516, Spain was then "full of herds

* Historia Hispaniæ, Pars I. cap. ii. Apud Beli scriptores. This author dedicates his work to Henry IV. King of Castile and Leon, who began to reign in 1454.

† Dillon's History of Peter the Cruel, page *146. ‡ Ibidem, Supplement, page 209.

§ Ustariz, I. 84.

" and flocks, so that the woods, mountains, meadows, fields, and forests, every " where resounded with their lowing and bleating. More especially it possessed " innumerable sheep, so that many shepherds whom he knew had flocks of 30,000 " each; on which account, Spain most abundantly supplied not only its own " people, but also foreign nations, with the very softest wool." " Est Hispania " præterea et pecoris omnis generis dives, gregibus et armentis plena, adeo ut " mugitu balatuque nemora, silvæ, montes, prata, campi, saltus ubique resonent. " Oves imprimis innumeras habet Hispania. Siquidem multos in Hispaniâ pas- " tores novimus, quorum unusquisque ovium triginta millia possidebat. Quapropter " lanas mollissimas non Hispaniæ solum populis, sed externis etiam gentibus oves " abundatissimè suggerunt."*

This account is confirmed by what is related by Sandoval, who states that, in an insurrection in Spain in 1519, the army of insurgents, among whom were many cloth-workers, stipulated, among other points, that the cloths imported into Spain, should be of the same size and goodness as those wrought there; and that the merchants and clothiers might have leave to seize, in order to work up, half the wools sold for exportation, paying the owners the price at which they had been bought.† Hence we learn the superiority of Spanish cloth, and the great sale of Spanish wool to foreign countries, at that time.

Damianus a Goes, who was page of the bedchamber to Emanuel King of Portugal in 1516, has written a short account of the memorable things of Spain, which he dates at Louvain in the year 1541. In this work he says, that there are annually exported from Spain to Bruges, 40,000 sacks of wool, each selling, at the lowest, for twenty gold ducats.‡ Now from an authentic acquittance, preserved in the Fœdera, from Queen Elizabeth to Cosmo de Medici, for a sum borrowed by him of Henry the Eighth, we find that the gold ducat, or florin, was, in 1545, equal to five shillings of our money. In this year, the 36th of Henry the Eighth, the base coinages began; but as Queen Elizabeth seems to have continued receiving the instalments of the Florentine debt, for several years, at the same rate, when the shilling was of something more than the present value, I think it probable that the

* De Rebus Hispaniæ, lib. i. † Sandoval apud Anderson, anno citato.

‡ Apud Belli scriptores. Vehuntur navigio Brugas, civitatem Galliæ Belgicæ, singulis annis quadraginta millia lanæ sarcinarum, quas Saquas vocant, quarum unaquæque ut minimum pretium viginti ducatorum aureorum vel æquat vel superat.

rate was fixed at the beginning of the year 1545, when the shilling was at 1*s.* 1¼*d.* of our present coin. This wool was therefore worth at least £5. 14*s.* 7*d.* the sack of 181½lbs. and £11. 9*s.* 2*d.* the sack of 364lbs.

In 1560, the time of Guicciardini, Spanish wool in the Netherlands was at a somewhat lower price. He tells us, "that they used formerly to send annually "from Spain to Bruges more than 40,000 sacks; but that in this year, the "Spaniards, having made more cloth at home, had sent only 25,000 sacks, at 25 "crowns each." "On souloit envoyer d'Espaigne à Bruges touts les ans plus de "quarante mille sacs de laine: mais depuis peu de temps en ça comme les Espaig- "nols se soyent mis à faire plus de draperie que de coustume, on n'en envoye plus "tant: de sorte que, l'an 1560, que j'escrivoy ceey, il n'en fut porté que vingt et "cinq mille sacs; lesquels à raison de vingt cinq escus pour sac, montent six "centz vingt et cinq mille escus."* The crown being 4*s.* and the shilling 1*s.* 0¾*d.* of our money, this would be £10. 1*s.* 1*d.* the sack of 364lbs. The depreciation seems, in truth, to have arisen from a diminished demand for this wool in the Netherlands.

We are now arrived at that period, when a just relation of facts would make it impracticable for us any longer to conceal the true secret with regard to Spanish wool. From what I have already stated, taken in connection with that which will follow, it will appear, that, till about this time, England and the northern part of the continent were so unskilful in the manufacture of cloth, that they could not employ the softer and finer wools, without a considerable admixture of that which was coarser and stronger. This is evidently the first use which was made of Spanish wool among us and the northern nations; and even that application did not commence till somewhat after this time, while that, which had been till then employed in the Netherlands, was of a coarser kind, adapted to the mechanical skill of those for whom it was destined. Of such wool a great exportation had taken place from Spain, and continued, according to Ustariz, till it was prohibited by Charles the Second of Spain in 1699.† Many of the wools of England were probably at that time, and still continue to be, superior to those of the native breeds of the northern and middle parts of Europe; for which reason, in the state of manufacture which then existed, they obtained a pre-eminence of reputation, which their great abundance very widely disseminated. But the cloths which they

* Guicciardini, 194. † Ustariz, II. 153.

produced being but of a middle quality, comparatively with those of Spain, were not suited to the taste of that people, who, therefore, according to Guicciardini, took very few of them, while they received immense numbers of the cheaper and coarser cloths fabricated in the Netherlands, which were calculated for the convenience of the lower and poorer classes.*

The superfine wools of Spain seem to have been first introduced among the Italian states. Thus Damianus a Goes in 1541, after having specified the 40,000 sacks to Bruges as before-mentioned, adds, "and also to Italy and other cities of "the Netherlands are annually sent about 20,000 sacks; of which those that are "used in Italy, being of the choicest wool, are sold at from forty to fifty gold "ducats each." "In Italiam quoque ac in alias Galliæ (Belgicæ) civitates, viginti "ferme millia sarcinarum vehuntur, quarum quæ in Italiâ consumuntur, quod "selectioris lanæ sint, quadraginta quinquaginta ducatis aureis singulæ venduntur."

From this account we have a fair opportunity of drawing two important inferences. The first is, that the Spanish wool which went to the Netherlands, was, as I have before observed, of the coarser kind, being of only half the price of that which was exported to Italy. Secondly, we can compare the value of the latter with that of our English wool; the best of which, according to the act of parliament in 1534 already quoted, did not, in England, exceed 5*s.* the stone of 14lbs, or £6. 10*s.* the sack of 364 lbs. The shilling being however then equal to 1*s.* $4\frac{1}{2}d.$ of our coin, increases the price of the sack to £8. 18*s.* 9*d.* to which add custom and subsidy £3. 13*s.* 4*d.* or £5. 0*s.* 10*d.* and the result will be £13. 19*s.* 7*d.* The additional charges of freight and merchants' profit would scarcely bring the whole amount to £16. 16*s.* On the other hand, according to the testimony of Damianus a Goes, the Spanish sack of $181\frac{1}{2}$ lbs. was in 1541 worth £14. 6*s.* $5\frac{1}{2}d.$ and the sack of 364 lbs. £28. 14*s.* 6*d.* of our present money. If the author speaks only of the value of this wool in Spain itself, then a farther addition must be made of freight, merchant's profit, and probable duty to the crown. On the whole, this calculation is sufficient to shew, in the strongest light, the superior price of superfine Spanish wool, to that of the very best at that time produced in Britain.

Next in order of time to the Italians, the manufacture of superfine wool seems to have been adopted by the French, who, according to Guicciardini, in 1560, sent

* Nous leur envoyons draps de plusieurs sortes, et en abondance de ceux que se font en ce Pays, et principalement en Flandres; et quelques uns d'Angleterre. Guicciardini, 192.

by land to Antwerp some very fine cloths of Paris and Rouen, which were highly prized.* It is probable, however, that these cloths were made only of mixed wool.

In 1582, English cloth was not risen in estimation with the Spaniards. We are told by Werdenhagen, that very little of it was at that time imported into Spain.†

To abate the patriotic zeal and self-complacency of our countrymen was still no easy task; for, in the same year, we find that honest Mr. Richard Hackluyt, though he allows that "Spaine now aboundeth with wools, and the same are "clothed," yet forbeareth not to assert to Master S. whom he addresseth, "You "cannot denie but that this realme yeeldeth the most fine wooll, the most soft, the "most strong wool," &c. &c.‡

Twenty years after this unqualified decision of Hackluyt, occurred the first instance which I can find of any disposition in our writers to acknowledge the superiority of Spanish to English wool. The author of "England's View," printed in 1603, pathetically exclaims, "Great was the loss and hindrance which "the realm received by the licence which King Edward the Third gave unto "King John of Arragon, for to transport into Spain a certain number of Cotes-"wold sheep, both in respect of wools and woolfels. For we see what great "quantity of wools, bettered under their climate, doth continually come from "divers places of the King of Spain's dominions into Fraunce and the Low Coun-"tries; especially into Flanders."§ At this period, therefore, not only the wool of Spain was better than that of England, but was used in great quantity in France and the Low Countries.

For many years before, and some after this time, English broad-cloths, as I have before observed, were, for the most part, sent out of England to be dyed and dressed by the Dutch, who refused to receive them when their exportation in that state was no longer permitted. This may be considered as the immediate cause of the great diminution of the export about the year 1616. But though it affected the cloths of our manufacture, it could have had no influence on the wool, the

* Quelques draps tres fins de Paris et de Rouen,—qui sont denrées fort prisées, p. 189.

† Anderson, 1582.

‡ Hackluyt II. 161. This writer was singularly quick-sighted to all the excellencies of that precious commodity; of which he had discovered, "that no wooll is lesse subject to mothes." Ib.

§ Smith I. 51.

exportation of which seemed, formerly, to have been limited merely by its great demand for home consumption; yet, in the year 1622, a special commission was issued by King James the First, to many lords and gentlemen, in which he states "the general complaints of our subjects at home, as also by information from our "ministers employed in parts beyond sea, that the cloth of this kingdom hath of "late years wanted that estimation and vent in foreign parts which it formerly had; "and that the wools of the kingdom are fallen much from their wonted values, "&c." for which, and many other weighty reasons, the king directs them to enquire, "why wool is fallen in price?" &c.* Our trade had indeed so much declined, that in 1623, as I have before shewn, the value of the imports exceeded that of the exports by £298,878. 7*s*. 2*d*.

Almost forty years had now elapsed, since the sacking of Antwerp by the Prince of Parma had caused many of its richest and most skilful manufacturers to take refuge in Holland. The people of that country, deprived of the lucrative process of finishing our cloths, soon entered on other branches of the manufacture; so that, in 1624, a certificate was given in to the British Parliament, of their having in that year made 25,000 cloths.† This necessity probably led them to try the qualities of various materials; and a very few experiments on entire superfine Spanish wool would naturally be followed by the disgrace, the contempt, and the neglect of ours.

A strong confirmation of the early use of the best Spanish wool, unmixed with coarser, by the Italian States, is furnished by Richlieu's Political Testament, printed in 1635, in which, speaking of the fine woollen manufactures of France, the author says, "The Turks prefer the draps de sceau de Rouen to all others, next to those "of Venice, which are made of Spanish wool."‡ And the author of "England's "Safety in Trade's Increase," written in 1641, tells us, that "the greatest part of "their (the Venetians') wools from Spain, and the rest from Constantinople, is "commonly brought in English shipping."§

In 1646, Nicholas Cadeau and other Frenchmen had letters patent for twenty years, for making at Sedan black and coloured cloths, like those of Holland, of the finest Spanish wool.‖

Among Thurloe's State Papers there is one written in the year 1651, and

* Fœdera, XVII. 40. † Smith, I. 116. ‡ Anderson, 1635.
§ Smith, I. 126. ‖ Ibidem, II. 173,

addressed to Oliver Cromwell, for the purpose of inducing him to monopolize all the wools of Spain. This pre-emption would, according to the author, "totally "dissolve the clothing of Holland, which, by means of these wools, hath of late "years mightily increased, to the destruction of the vent of all fine cloths of "English manufacture in Holland, France, and the east country. The Hollanders "have of late years bought and exported from Biscay four-fifth parts, at least, of "all their wools. The French have also considerable quantities of wool from "Biscay, which they work up into cloth at Rouen, and other parts." The author adds, that "scarcely one cloth of the Hollanders was made of other than Spanish "wool; and surely not one but by a mixture of the most part of it;" and "that fine "Spanish wool costs three times as much as our ordinary English wool."*

Still were we not convinced. The writer of the work called the "Golden "Fleece," in 1656, perseveres in the assertion, that "though the wools of Spain "are finer than any other part of the world, yet neither by itself, nor by incorpo- "ration with the wools of any other nation, will it be wrought into any cloth, "without the help and mixture of English wool." †

I have observed above, that the inhabitants of the North of Europe were not, at first, able to manufacture fine Spanish wool without the assistance of that which was longer and coarser. But what, in the beginning, was a matter of necessity, became afterwards an object of choice; and the more skilful clothiers, whether in Holland or elsewhere, either carding the finer and dearer Spanish with the coarser and cheaper English, or forming the warp of the latter, which they covered with a woof of the former, contrived to make a cheap and serviceable cloth, which pleased the eye equally well with the more costly fabrics of entire Spanish wool. This, though at the time generally with great care concealed, yet is afterwards candidly acknowledged by writers actually engaged in the commerce of wool; and sufficiently refutes the prejudices which had here prevailed from the middle of the 16th to the middle of the 17th century. Hence it appears, that our wool; when placed in connection with Spanish, was chiefly valuable from being well calculated, not to improve, but to adulterate it. ‡

A treaty between France and Spain, in 1659, enabled the former freely to obtain the wool of the latter, and thus to gain great advantage over us in the Levant trade. §

* Smith, I. 131, note. Anderson, 1651.

† Smith, I. 140.

‡ Smith, I. 238, &c. &c.

§ Anderson, 1659.

It seems that about this time our eyes first began to be opened. In 1660, the year of the restoration of Charles II. the best Spanish wool was at 4*s.* 4*d.* per pound; while the best of ours was at eighteen-pence.*

In 1665, the 5th of Charles II. a Dutch or Flemish Protestant, named Vanrobais, was settled by the French king at Abbeville, with great privileges, in order to manufacture cloth of Spanish wool.†

About this time, from 2000 to 7000 bags of that wool were annually purchased by us.‡

In 1668, the ancestor of Mr. Wansey bought Refina Spanish wool at 2*s.* 6*d.* per pound; and four years before had paid sixteen-pence for the very best English.§

The same year, we were first taught to make cloth of superfine Spanish wool, without mixture of that of inferior quality, by one Brewer, who settled in England with about fifty Walloons.‖

About the same time an author of great commercial knowledge and candour, Sir Josiah Child, tells a truth, which must have been in the highest degree ungrateful to many of his prejudiced contemporaries: "As to the Turkey, Italian, Spa-"nish, and Portugal trades, though our vent for fine cloths, and some sort of "stuffs, be declined, yet we retain a considerable part, for this reason among "others, viz. because the wool of which our middling coarse cloths are made, "is our own."¶

A similar sentiment is expressed, in 1678, by the writer of "Ancient Trades "decayed," who says, that "without the help of our wool, there could be no or-"dinary low-priced cloth made."**

A terrible reverse this!—that what, in 1582, was pronounced to be "the most "fine wooll, the most soft, the most strong wooll," should, in less than a century, turn out so inferior, as to afford its possessors no better consolation, than that it was still the best in the world for middling, coarse, and low-priced cloth!

In 1676, the 17th of Charles II. Spanish wool was at 2*s.* 2*d.* and our best at 8*d.* per pound. The low price of our wool, according to the author of the "Treatise of Wool and Cattle," which I quote, was in part owing "to our wear-"ing so much Spanish cloth ourselves, and a great part of that not manufactured

* Smith, I. 223. † Idem, II. 173, 174, 175. ‡ Idem, II. 252.
§ Practical Observations on Wool, page 6, note. ‖ Smith, II. 336.
¶ Smith, I. 155. ** Idem, I. 229.

"by ourselves, as Dutch blacks, &c. For this cloth trade," continues he, "is our "antient right, and did always belong to our nation; and no other people in the "world could in reason pretend to the manufacture, the staple growing on our "own soil. And since there is now another sort of wool started up within these "few years, which proves to the prejudice of our's, I see no reason why we should "not, if we can, compass to make our own, and that too."*

The author of "England's Advocate," in 1699, asserts, that "it hath been "proved more than once, before Parliament, that no cloth of above ten shillings "per yard, white, or thirteen shillings per yard, in mixed colours, sold at Blackwell "Hall, hath one dram of English wool therein."†

Lastly, to close this long series of historical documents, a writer in the periodical paper called the "British Merchant," in the year 1713, says, "I am afraid "Portugal, as well as Spain, has better wool than ever grew in England."‡

The superiority of Spanish to English wool was now universally acknowledged throughout Europe.

Now as those, who contend that Merino sheep originated in England, will readily grant, what indeed cannot be denied, that no such breed now exists among our native races, and, therefore, that we have lost what Spain has so advantageously gained, I would beg leave to ask, at what period of our history could we have suffered this loss?

Did it take place between the years 1300, and 1540, when, as I have shewn, our wool and manufactures were gradually rising in reputation and consequent value?

Did it occur between the years 1540, and 1610, when our wool and manufactured cloths were in the greatest estimation? or, lastly,

Did it happen between the years 1610, and 1623, when both those commodities fell into contempt, and consequent rejection by the rest of Europe?

During the whole time included within the two first periods, which is more than 300 years, we continued uniformly to express our decided conviction of the preeminence of our wool; and at what moment during that long space, and under such circumstances, shall we dare to impeach our ancestors either of ignorance or wilful falshood?

To admit of such a loss during the first period would, indeed, be to give up our

* Smith I. 223, 225. † Idem. I. 333. ‡ Idem. I. 394.

pretensions; because our commercial fame, which was then only rising, was not fully established till the second period.

Then it was that we boasted of our wool with the greatest insolence of pride. Then, the exportation of our cloth was the largest, and it sold at Antwerp as a commodity rare, and of high price. Then, lastly, we endeavoured to secure the undivided property in this treasure, by punishing with death the introduction of our sheep into foreign countries. To admit, therefore, that the breed of Merino sheep had been lost before, or during this period, would be to acknowledge, that all our claims to pre-eminence were founded on the use of a raw material, which, half a century afterwards, the concurrent voice of all Europe determined to be fit only for the manufacture of ordinary, or low-priced cloths.

Let us then suppose, as we necessarily must, that if the Merino race existed at all in this country, it continued till the reign of James the First. At that period our wool and cloths began to fall into disrepute with foreign nations. If this misfortune arose from the deterioration of our wool, that deterioration must, by the supposition itself, as well as by the nature of the case, have been owing to the substitution or admixture of some inferior breed of sheep. But a distinct race of those animals, sufficient in number to furnish wool to one third of Europe, could not be at once annihilated. Neither could any admixture with a coarser breed have taken place without the knowledge, and even the concurrence, of the proprietors of flocks. Besides, the operation of such causes must have been sufficiently obvious to every man's observation. It was not more than twelve years from the greatest height, to the lowest ebb of our exports of cloth; and only forty-three, or forty-four, from the former period to the year 1651, when the superiority of Spanish to English wool was so acknowledged, as to suggest the scheme already mentioned of monopolizing the whole produce of Spain. All this space of time must have been within the extent of memory of many persons then living; whereas, according to the hypothesis against which I am contending, not only the whole breed itself, but the very recollection of it, must within the short period of twelve years, have utterly perished: for, otherwise, it would have been ridiculous for King James, in 1622, to have convened a solemn assembly of Lords and Commons, in order to discover why wool was fallen in value, when any illiterate shepherd could have told him, "Increase, or restore your Merino flocks, and then you will have plenty of

superfine and valuable wool." So also, when, in the middle of the 17th century, Merino wool first made its appearance in England, where were the thousands of persons, only approaching to old age, who exclaimed, "Yes, this is the wool, which, forty years ago, when I was a youth, employed half the population, and supplied half the wealth of the kingdom!' Instead of this, we find it, in 1676, described as "another sort of wool," which nobody recognized, and which "was within these few years started up among us."

The loss of the Merino breed of sheep during the last period was, therefore, morally and physically impossible; and if any farther arguments were wanting to prove its improbability during the two former periods, they might be readily supplied. If, in the common transactions of life, with no view of averting or removing any evil, or obtaining any benefit, a man were voluntarily to relinquish a possession, from which he derived his chief enjoyments and even his subsistence, who is there, that would not instantly determine him to be either an ideot, or a lunatic? The fine wool of England was such a possession; and yet, according to this wild notion, every farmer, every land-holder, every manufacturer, every person connected with these different orders, every man interested in the comforts, dependent on the wealth, or proud of the honour, of his native country, suffered this inestimable possession to be lost, and lost even without a complaint.

The fact, however, is, that we could not lose that which we never possessed. Our triumph was founded on ignorance. At the very moment when we exulted most, we knew not that wool existed in Spain, which, for sixty years, had been selling to other countries at nearly twice the price of our's. It was not till after all other nations had learned to employ, and prefer this wool, that we yielded our slow, and cold assent to its superior excellence.

Then, the language of querulousness succeeded to that of boasting; till, at length, amused like children, and lulled by the fictions of our political nurses, we gradually sunk into the slumber of contented acquiescence.

But, it will be argued, if the Spaniards were already in possession of sheep with finer wool than ours, why were they so desirous of obtaining our rams?

To this argument I begin with answering, that the facts themselves are extremely doubtful.

With regard to the earliest; in the midst of a verbal altercation between the relations of two Spanish grandees in 1437, one accuses the friend of the other of

being implicated in an event, which had occurred nearly a century before. This event was only remotely connected with the fact in question, which might have had no better foundation than report, and which, if false, his opponent was not interested in refuting.

Edward the Third, who now reigned in England, was sufficiently jealous of the preservation of our wool, which he had abundant reason to consider as the chief source of our wealth, and his own revenue. The exportation of live sheep would have been esteemed a most flagrant violation of the public welfare, of which he would have obtained the earliest information, and which he would have employed the most effectual means to prevent. Thus, in the proclamation in 1338, already quoted, having heard that live rams had been bought up by strangers, and were then lying for exportation on ship-board, in the port of St. Botolph's, he states the great damage and loss that would thence accrue to this country, from the diminution of the price of our wool, and the amendment of that of foreign countries: but far from appearing to suspect any past practices of a similar kind, he simply orders his bailiffs, &c. diligently to examine the ships in the said port, so as to prevent such exportations by any persons whatever, and to cause these individual rams to be re-landed, and in no wise to be transported to the said foreign countries. *

The exportation of Cotswold sheep, in the time of Edward the Fourth, rests on little better authority. Two instances of this kind are alleged; one to the King of Castile and Leon, in 1464; the other to the King of Arragon, in 1468. They are mentioned together by Stow and Speed, as occurring in 1465; so that many persons judge the two reports to allude to a single act. They are, I believe, spoken of by no author before Stow, who did not publish till 1592, 127 years after the supposed fact. I can discover no treaty whatever between these

* Rex Ballivis Villæ de Sancto Botulpho, &c. Quia ad nostrum pervenit auditum, quod diversi homines, de partibus exteris, tam mercatores quam alii, diversos Arietes vivos infra Regnum nostrum emerunt, et eos usque ad dictum portum duxerunt, et ultra mare ad dictas partes exteras, in fraudem et deteriorationem pretii Lanæ infra Regnum nostrum prædictum, et emendationem Lanæ in dictis partibus exteris ducere intendunt, quod si toleraretur, in nostri præjudicium, et totius populi Regni nostri dampnum, et jacturam cederet manifeste; nos vobis mandamus, quod hujusmodi Arietes vivos in dicto portu ad partes exteras nullatenus cariari permittatis et omnes Arietes vivos, quos in eisdem navibus inveneritis, extra easdem ad terram ponatis; ita quòd ad dictas partes exteras nullatenùs ducantur quovis modo. Septimo die Maii an. 12. E. III. Fœdera, V. 36.

monarchs in 1465; and the important present is not mentioned in those, which, according to some subsequent authors, it is said to have followed. Neither is there to be found any express mandate for the exportation of these sheep, although such a deviation from established principles would naturally have required a form, which seems to have been generally resorted to on much less important occasions. Some persons have attributed this silence to the delicacy of Edward, who did not choose openly to shock the scruples of his subjects, on so popular a topic.

It seems, however, that the acute feelings of the monarch were soon happily blunted; for in fourteen years afterwards, we find him, by open proclamation, permitting his sister the Duchess of Burgundy, to export from England, not twenty-five sheep, and on a single occasion, but 2000 rams, and that every year during her life.

Let us, however, for a moment, admit these exportations to Spain. I have already proved that, at this time, Spain was full of sheep. The country was uninclosed, and the immense flocks, by immemorial custom, took their long and annual journies in quest of food.* Under these circumstances, five rams and twenty ewes, introduced to a new climate and new management, are to change the millions which constitute the entire breed of a vast country! So judge manufacturers, chained to their looms, or historians blind with poring over the midnight lamp. An experienced farmer, aware of the difficulty of establishing a new breed in the most favourable situation, would as readily believe that the whole ocean could be blackened by one vessel of ink. Nothing, indeed, could be more easy than to demonstrate the absolute impossibility of producing the supposed effect in such a country as Spain, under any probable management of their native flocks.

On the other hand, in Holland, where, from the earliest ages, the necessity of draining caused the meadows to be separated into small inclosures by wet ditches impassable by sheep, there was the best possible opportunity of making such an experiment; and an annual introduction of 2000 rams might, in a very short time, colonized the whole country with a new race of inhabitants.

Where then are the Merino sheep in Holland, which sprung from this union? Will it be replied, that, in process of time, the climate, soil, and food would

* I have shewn above that a tax on these travelling sheep was established by law in 1457. See page 377.

necessarily bring the English breed to the nature of those found in the country to which they were introduced? This reasoning, if admitted, would be fatal to the whole argument; because it would prove that English sheep did not come Merinos into Spain, but became Merinos, like their aboriginal neighbours, by long residence there. The fact, however, is otherwise. We know that, at this very time, the final produce of Merino rams with the ewes of Holland is a small breed, yielding short wool altogether as fine as that of their pure sires in their native country. Where then, I repeat, are the fine woolled sheep in Holland, from this old and well established English cross? They do not exist. The Friseland and Texel breeds are among the largest sheep in the world, producing, like those of Lincoln, very heavy fleeces of the longest combing wool.

If, then, among these asserted exportations of English sheep, we admit the only one for which there is any historical authority, or which, if they had all existed could have produced the supposed effect, I should consider the nature of the present sheep of Holland as an evidence, from which, so far as it went, there could be no appeal, that our sheep were a coarse long woolled breed, very different in wool and carcase from the present Merino.

In reality, writers on this subject take one great and unjustifiable liberty. They assume it is a principle that no people, desirous of our sheep, wanted any others than those which furnished short superfine wool. In former times, before Spanish wool was known among the people of the north, the great object seems to have been to procure cloths, which, with a shewy outside, were remarkable for strength rather than for softness. The only cloths wanted by the Spaniards themselves were of the inferior kind; and of these they imported large quantities from the Netherlands. Many also of the most valuable manufactures of those ages, as worsteds, and all sorts of stuffs, required long combing wools. For these different purposes, no wools in Europe were, probably, so valuable as those of England. They still maintain the same superiority; and if the jealousy, with which they were guarded in this country, be considered as an evidence of any particular species of merit, it should be recollected, that the same penal laws against the exportation of sheep exist among us at this day, when few persons will be disposed to imagine that their introduction into Spain, could be intended to improve the fine wool of that country.

The relative value of our ancient wools was sufficiently shewn by their price in

the different counties. That of Salop was in the highest class. It was probably then the best clothing wool; and that of the Morfe common is still the finest in England. The wool of Lincoln was, however, of equal value; and no one will pretend to affirm that the breed inhabiting the deep pastures of that county was then essentially different from what it now is, a breed affording the very best combing wool in this kingdom. The Cotswold sheep, to which is assigned the honour of having established the Merino succession in Spain, produced wool of only a third rate in price. At this time, they hold a sort of middle place between the long and the short woolled breeds; and their wool, which is rather coarse in the filament, is, by itself, for the most part, too long for clothing. That this breed was exactly of the same kind two centuries ago, we have the evidence of the Poet Drayton, who, in his Polyolbion, published in 1612, thus describes it:

" And now that every thing may in the proper place
" Most aptly be contriv'd, the sheep our wold doth breed,
" The simplest tho' it seem, shall our description need;
" And shepherd like, the Muse thus of that kind doth speak,
" No brown nor sullied black the face, or legs doth streak,
" Like those of Moreland, Cank, or of the Cambrian Hills,
" That lightly laden are: but Cotswold wisely fills
" Her's with the whitest kind; whose brows so woolly be,
" As men in her fair sheep no emptiness should see.
" The staple deep and thick, through to the very grain,
" Most strongly keepeth out the violentest rain.
" A body long and large, the buttocks equal broad;
" As fit to undergo the full and weighty load.
" And of the fleecy face, the flank doth nothing lack,
" But every where is stor'd; the belly as the back.
" The fair and goodly flock, the shepherd's only pride
" As white as winter's snow, when from the rivers side
" He drives his new wash'd sheep."*

Though Drayton published his poem in 1612, he was born in 1563; and being the son of a butcher, must probably have been conversant with sheep in his early youth, more than thirty years before he wrote, His description agrees very minutely with that of our present Cotswold breed; but no one in this country

* Polyolbion; fourteenth song.

would speak of the depth of the staple of wool, or the length and largeness of the body, and breadth of the buttocks, as characteristic excellencies of the Merino race.

We have some evidence of the general nature of our sheep, at a still earlier period, 1533, the twenty-fifth of Henry VIII. when we have seen that they greatly abounded, in the Historia Anglica of Polydore Virgil. He says that there are "every where in England hills unsheltered by trees, and unwatered by springs, "producing the shortest and finest herbage, which, nevertheless, furnishes abundance "of food to sheep. Over these hills there wander flocks of sheep of an extraor- "dinary whiteness, bearing fleeces much finer than any others." "Colles passim "multi, nullis arboribus consiti, nullisque aquarum fontibus irrigui, qui herbam "tenuissimam atque brevissimam producunt, quæ tamen abunde ovibus pabu- "lum suppeditat. Per eos ovium greges candidissimi vagantur, quæ longè "omnium aliarum tenuissima ferunt vellera." *

According to this author, the sheep yielding these very fine fleeces were not "albæ," that is simply white, but of a bright or brilliant whiteness; and not merely "candidæ," but "candidissimæ;" of a whiteness superlatively bright. This epithet might be reasonably enough applied by a foreigner to our native sheep on the mountains, comparatively with those which he had been accustomed to see in Italy, or Spain; but would ill suit the Merino, the external appearance of which would lead a stranger to them to suspect that they had been first rolled in a kennel, and then compelled to make a progress through a chimney. To employ the terms superlatively brilliant whiteness as characteristic of a Merino sheep, is much the same as if, by way of accurate discrimination, we were to speak of the downy softness of a file, or the hoarse thunderings of a flute. The Merino, therefore, was certainly not the breed, which wandered on our hills in the year 1533.

In the quotation given above from Drayton, the same quality of whiteness is attributed to the Cotswold sheep. Their faces and legs, are said to be never sullied with brown or black. Those of the Merino, on the contrary, are very often speckled or clouded with a reddish brown, or fawn colour. And so far are they from becoming "as white as winter's snow" when "newly washed," that no washing in any stream of mere cold water, will do more than bring their fleeces to a hue of yellowish brown, or gray.

* Lib. I. page 12.

The lives of these three authors, Polydore Virgil, Stow, and Drayton, occupy the whole period when our wool and cloths were most coveted; and so far are they from having been sensible of any degeneracy in our sheep or wool, that two of them, expressly describing those objects, speak of them in strains of the highest panegyric.

On the whole I think it reasonable to conclude, 1st. That, from the year 1300, the breeds of English sheep, and consequently their fleeces, have uniformly continued to be much the same as they now are; all widely different from the Merino; and 2dly. That if sheep were ever exported, or intended to be exported, to Spain or other countries, it must have been, so far as their fleeces were concerned, for the express purpose of establishing there a comparatively coarse, and perhaps a long-wooled race. *

It appears, therefore, that the notion of the English origin of the Merino breed of sheep, however it may have served to flatter the national pride, falls to the ground as soon as it is coolly and deliberately investigated.

Another origin is suggested by a writer in the folio French Encyclopedie, who boldly asserts, that this race was formed about the time of the Emperor Claudius from importations of African rams by Columella, uncle of the celebrated agricultural writer of that name. According to the Encyclopedie, Marcus Columella, who derived "his chief pleasure from a country life, was struck with the brilliant "whiteness of fleeces which he had seen on certain wild rams that the merchants "of Africa had imported for the public games. Immediately he determined "to try if he could not tame these animals, and establish the breed in the neigh-"bourhood of Cadiz. He succeeded; and carrying his experiments still "farther, coupled African rams with common ewes. The produce of this cross, "with the delicacy of the mother, had the whiteness and quality of wool of the "father." †

* In all these discussions, I have said nothing of the carcase, which, in our breeds, for full a thousand years, has always made *some part* of the value of the sheep, and in which, I presume, they have always been at least equal to those of foreign countries. Mr. Ellman, and the disciples of Mr. Bakewell, might still think their sheep worthy of being coveted by the Spaniards, though they did not produce a single ounce of wool.

† Encyclopedie, article Laine.

It would be difficult to conceive a more gross misrepresentation of the real fact than that contained in the preceding sentences, which were meant as a paraphrase on the account of Columella the younger himself. Speaking of the Roman sheep, that author had remarked that white fleeces were most valuable, because they could be coloured; but coloured fleeces could not be made white.* He says, however, that the latter were also worthy of praise, as, for example, "the pulla," or blackish fleeces of Pollentia in Italy; the "fusca," or tawny of Boetica in Corduba, and the "rutila," the reddish or golden of Asia. He then adds, "experience also has taught us how to obtain other varieties in this race of "animals; for when, among other beasts, wild rams of an extraordinary colour were "brought to Cadiz from the neighbouring woods of Africa by the purveyors, Marcus "Columella, my paternal uncle, a man of quick parts, and a celebrated farmer, "brought some to his fields, and having tamed them, introduced them to his "Tarentine, or fine woolled ewes. From this first union sprang ram-lambs with "coarse wool, but of the paternal colour. These being again put to ewes like the "former, generated rams with a still finer fleece; which being in the same way "coupled with the Tarentine ewes, universally produced lambs, which united with "all the softness and fineness of the wool of the mother, the colour of that of the "father and grandfather. "Sed et alias varietates in hoc pecoris genere docuit "usus exprimere. Nam cum in municipium Gaditanum ex vicino Africæ miri "coloris silvestres ac feri arietes sicut aliæ bestiæ munerariis deportarentur, "M. Columella, patruus meus, acris vir ingenii, atque illustris agricola, quos- "dam mercatus in agros transtulit, et mansuefactos tectis ovibus admisit. Eæ "primum hirtos, sed paterni coloris agnos ediderunt, qui deinde et ipsi Taren- "tinis ovibus impositi, tenuioris velleris arietes progeneraverunt. Ex his rursus "quicquid conceptum est, maternam mollitiem, paternum et avitum retulit "colorem."

It appears, therefore, that far from attempting, according to the assertion of the Encyclopedist, to produce white and fine woolled posterity by uniting rams of a

* Color albus, cum sit optimus, tum etiam est utilissimus, quod ex eo plurimi fiunt, neque hic ex alio. Sunt etiam suapte natura pretio commendabiles pullus atque fuscus quos præbent in Italia Pollentia, in Bœtica Corduba. Nec minus Asia rutilos, quos vocant ἐρυθρούς. L. J. M. Columellæ de Re Rustica lib. vii. cap. 2.

similar quality with coarse ewes, Columella tried, in this instance, to obtain fine woolled, coloured lambs, by coupling coloured coarse rams, with white fine woolled ewes. Neither does it at all follow from the words, "in agros transtulit," that Columella placed these rams on any lands of his in Spain. It is much more probable, even from the words themselves, as well as from the nature of his object, that he brought them into the Roman territories in Italy, where, as we shall hereafter see, there were abundance of the "oves tectæ," "molles," or "Tarentinæ," which were chiefly valued for superfine white wool.

It is well known that all ranks of people of both sexes among the Romans chiefly wore woollen garments. Even so late as the reign of the Emperor Aurelian, 270 years after Christ, a pound of silk, according to Vopiscus, was equal in value to a pound of gold. A people so pre-eminent in wealth, and in all the refinements of art, would naturally be solicitous to attain the highest degree of excellence in the materials of those fabrics, which, by adorning their persons, were calculated to gratify one of the most prevailing passions of the human mind. Neither was it less necessary for them to consult their ease than their vanity. The heat of Italy was at certain seasons of the year so great, that the affluent would scarcely have supported a woollen dress, had it not consisted of filaments sufficiently fine to be worked into the thinnest and lightest cloth. This quality must have been, more especially important, since we find that, during the Augustan age, and for a considerable time afterwards, it was the fashion to wear cloths, which, as at present, were furnished with a nap or pile. Such cloths were called "pexæ," in contradistinction to "tritæ," or threadbare. Thus Horace;

——————"si forte subucula pexæ
"Trita subest tunicæ ——————
"Rides."—*

"You laugh, if you espy a threadbare vest
"Under a well pil'd tunic."

And again Martial;

"Pexatus pulchre, rides mea, Zoile, trita."†

"In well dress'd cloth array'd, Zoilus, you mock
"My threadbare garment."

* Epistola I. Lin. 95. † Epigrammatum lib. ii. 58.

Varro,* Columella,† Pliny.‡ Martial,§ Palladius,‖ Petronius,¶ and Calpurnius Siculus** agree in stating that the sheep which were generally understood as producing the finest wool in the Roman dominions were those of Apulia and Calabria. Columella however speaks of the wool of the Altinates, in the vicinity of the Po in Cisalpine Gaul, as more valuable than that of Italy; †† and Pliny himself acknowledges that in his time no wool was sold dearer than that in the neighbourhood of the river Po. He adds that the price of wool had never exceeded a hundred sestertii the libra or pound.‡‡ Now the Roman sestertius being about seven farthings and three quarters of our money, and the libra about 5245 grains, it follows that an avoirdupois pound, or 7008 grains of this wool, would have cost about £1. 1*s.* 7*d.* of our money. This price shews the estimation in which fine wool was then held; and must have operated as a sufficiently strong motive to introduce, maintain, or improve, by all possible means, any sort of sheep which would furnish this rich commodity.

At that very time, according to various ancient authors, Spain itself was not without valuable breeds of sheep. But these breeds were memorable only for two points, one of which was their being what was called "nativæ,"§§ or bearing fleeces which were naturally of different tints. At a time when the art of dying was little understood, it was certainly no small merit in wool to be capable of being manufactured into cloths of various colours without that difficult and expensive process. Columella, himself a Spaniard, speaking, in the passage already alluded to, of the sheep of Boetica in Corduba, which was the province of Andalusia in Spain,

* Varron. lib. ii. cap. 2.

† Generis eximii Milesias, Calabras, Appulasque, nostri existimabant, earumque optimas Tarentinas. Columellæ lib. vii. cap. 2.

‡ Lana autem laudatissima Apula, et quæ in Italia Græci pecoris appellatur, circa Tarentum summam nobilitatem habent. Hist. Natur. lib. viii. § 73.

§ Se Lacedæmonio velat toga lota Galeso. Martial. Epigram. lib. ii. 43.

‖ November, § XIII.

¶ Arietes a Tarento emit, et eos curavit in gregem. Petronii Arbit. cap. xxxviii.

** Totque Tarentinæ præstant mihi vellera matres. T. Calpurnii Siculi Ecloga II. lin. 69.

†† Nunc Gallicæ pretiosiores habentur, earumque præcipuè Altinates. Columell. vii. 2.

‡‡ Alba Circumpadanis nulla præfertur; nec libra centenos nummos ad hoc ævi excessit ulla. Hist. Natur. viii. 73.

§§ Quas nativas appellant, aliquot modis Hispania. Ibidem.

gives them no other praise than that of producing blackish or tawny coloured fleeces. Pliny, who lived somewhat after Columella, adds that they were occasionally of a reddish, or gold colour, like those of Asia.* Martial expressely compares the colour of those fleeces with that of the golden or red hair of women.†

Strabo, who flourished in the reigns of Augustus, and Tiberius, says of Turdetania in Portugal, then a part of Spain, "That formerly they imported "many garments, but that now their wool was better than that of the Coraxi, and "so beautiful, that a ram for the purpose of breeding was sold for a talent; and "that fabrics of extraordinary thinness were made of this wool by the Saltiatæ." "Πολλὴ δὲ καὶ εσθὴς πρότερον ἤρχετο· νυν δὲ ἔρια μᾶλλον των Κοραξων· καὶ ὑπερβολή τις εστὶ τε "κάλλες· ταλαντιαίοις γαν ὠνουνται τοὶς κριοὶς εις τὰς· ὀχείας ὑπερβολὴ δὲ καὶ τῶν λεπτῶν "υφασματῶν, ἅπερ οἱ Σαλτιῆται κατασκευάζοισιν." ‡ Any ambiguity which might attend this passage is removed by Pliny, who expressly tells us, that this breed did not produce what could be properly called wool, but hair. "Istriæ Liburniæque pilo "propior quam lanæ, pexis aliena vestibus, et quam Salacia scutulato textu com- "mendat in Lusitania." "The wool of Istria and Liburnia is more like hair than "wool; being totally unfit for cloths dressed with a nap or pile, and such as "Salacia in Portugal advantageously uses for thin, reticulated fabrics." § I have already explained the word "pexus;" and when it is considered that Pliny afterwards annexes the epithet "scutulatus," to the spider's web, ‖ he must in the present instance evidently understand by it some cloth of a light open texture, like our finest stuffs, muslin, or gauze, altogether incapable of being constructed of any thing similar to our best carding wool, but rather manufactured from fine, long, combing wool, such as that of Shetland, or of the sheep or goat of Thibet, at this day.

* Jam Asia rutili, quas Erythræas vocant. Item Bœtica. Histor. Natur. viii. 73.

† Quæ crine vincit Bœtici gregis vellus. Epigram. lib. v. 38.

‡ Strabonis Geographiæ Casauboni lib. iii. page 144. The little Attic talent of silver contained sixty minæ, and the mina an hundred drachmæ or denarii. The Attic drachma, according to Greaves (Vol. I. page 262) weighs sixty-seven English troy grains. Now if the alloy, as in our coin, made three fortieth parts of the whole, then the pure silver in a talent would be 371,850 grains; which divided by eighty-six, the weight of pure silver in our present shilling, will make the talent upwards of £216. of our money. The long woolled ram of Portugal was therefore fully equal in value to the best of our breeds.

§ Hist. Nat. lib. viii. sect. 73. ‖ Ibidem. xi. 28.

Upon the whole it may be safely inferred, that as neither Columella, Pliny, nor other Roman writers, expressly citing the sheep of Spain, notice any breed producing wool fit for the manufacture of fine dressed cloths, such sheep could not possibly, in their times, have existed in that country.

The French Encyclopedist pursues his romance, and tells us, "that notwithstanding this ingenious project of Columella, which fell to the ground, as is usually the case where the best designs do not meet with the support of government, thirteen ages elapsed before any one in Spain renewed his experiments. Don Pedro the Fourth, who mounted the throne of Castile in 1350, was the next who attempted to increase and meliorate the wools of his country. In order to secure the affection of the Castilians, whose support he wished against the party of his bastard brothers, and Eleanora their mother, he availed himself of the friendship of a Moorish prince to import from Barbary a large number of rams and ewes of a very beautiful kind, which, in that country, were very profitable to their owners. This project could not fail of success; and thus, in the 14th century, a numerous breed of sheep, abounding with the finest and most silky wool, was established in Spain. Cardinal Ximenes, first minister of that country in the reign of Charles V. at the beginning of the 16th century, marched in the same happy steps; and taking advantage of some military success on the coast of Barbary, renewed the importation of the finest woolled rams and ewes, which he placed chiefly in the neighbourhood of Segovia."*

To say nothing of the affected simplicity, but real inconsistency of this relation, one might naturally expect that the history of events so important to Spain should have been established by a reference to some contemporary or authentic records. On this head, however, the author is wholly silent. I have looked with eager hopes of better information, but with no greater success, into a memoir in the second volume of the Academy of Sciences at Brussels. Mons. Durondeau is merely a retailer of the dreams of Messrs. the French Encyclopedists; and very gravely gives Don Pedro the appellation of fourth King of Castile.

These writers possess a happy independence of narration. No Don Pedro, the fourth of that name of Castile, nor any Don Pedro, fourth king of Castile, ever existed. The kingdom of Castile saw but one sovereign of the name of Pedro, who did indeed mount the throne in 1350, but, instead of being the fourth,

* Folio Encyclopedie, article Laine.

was the thirty-ninth monarch from the nominal commencement of the kingdoms of Castile and Leon under Pelagius, after the death of Róderic, last king of the Goths, in 714. This Don Pedro was Peter, commonly called the Cruel, who reigned 19 years, and, while supported by Edward the Black Prince of Wales, was successful against his brother Henry; but was afterwards defeated and slain by him.

Histories of this prince are given us by various ancient writers. Among these, Alfonsus a Carthagena, Bishop of Burgos, author of the Anacephalæosis of the Kings of Spain, in 1456, must have lived within 30 or 40 years of the death of Pedro; and the work of Rodericus Santius, Bishop of Palentia, De Rebus Hispaniæ, was published in the reign of Henry IV. who succeeded to the crowns of Castile and Leon in 1454. After the birth of these writers, all the remarkable occurrences in the reign of Peter must have been remembered by many persons then living; and any event which, in the words of the Encyclopedist, had "tended "to secure the affection of the Castilians," would probably have been seized and commemorated by the historians. But not a word is said by them on this subject. Neither is any farther information respecting it to be derived from Franciscus Tarapha, Canon of Barcelona, who wrote on the Kings of Spain, or from the long history of that country by Lucius Marineus Siculus, Royal Historiographer, both in the reign of Charles the Fifth.

The same ignorance of this event is exhibited in the recent History of Peter the Cruel, by Dillon, who had access to all the best political and historical writers of Spain, and who, if it had been discoverable in them, would necessarily have considered it as of too great importance to have been omitted in his relation of the Spanish commerce in wool at that period.

All the historians, to whom I have had access, are equally silent on any importation of sheep from Barbary by Cardinal Ximenes. That ecclesiastic, who administered the public affairs of Castile while Ferdinand the Catholic was regent after the death of his son-in-law Philip, commanded an army, which, in 1509, made a successful attack on the Moorish city of Oran. This war continued one or two years afterwards; and Ximenes himself asserted, that he gained from it no personal emolument but a few Arabic manuscripts, and some other curiosities for his library.*

From the accession of Charles the Fifth, in 1516, no active hostilities were

* Flechier Histoire du Cardinal Ximenes, page 327.

carried on against the Moorish coast by order of Ximenes, except an attempt that same year by Don Diego Vera on the town of Algiers, defended by the famous Barbarossa, who repulsed the Spanish army with considerable slaughter. The Cardinal died the following year.

At this day, abundance of sheep are carried to Spain and other parts of Europe from Barbary; but among them we find no traces of the Merino breed. One of the rams of Barbary I have seen. He was a large, well-made, hornless animal, entirely covered, not with wool, but with strong, short hair, like a smooth Newfoundland dog, or rather like a deer, and of the deepest black. Wool, also, is every year purchased by England from Barbary, and other parts of Africa: but none of it is, comparatively, fine.

From all these circumstances taken together, it is probable, that the Merino race of sheep was not introduced into Spain from Barbary, as asserted by the French Encyclopedists.

I have adverted above to the attention which the Romans paid to their sheep. These appear to have been chiefly of two kinds.* One, which had comparatively coarse and long wool,† was, on those accounts, called "hirtum," or "hirsutum," rough, hairy, or shaggy; and from its hardiness and ruder treatment, "colonicum," or rustic. The other breed, which, from producing the fine short wool,‡ was much valued, and the object of peculiar care, was called by various names; "molle,"§ tender; from its delicacy of constitution, or treatment; or perhaps soft, from the quality of its fleece; "generosum," or noble, from its excellence; "pellitum,"‖ from its being generally clothed with skins, in order to preserve its wool; "tectum," for the same reason, or, perhaps, from its being usually housed; "Apulum," "Calabrum," "Tarentinum," "Atticum," and "Græcum,"¶ from the neighbourhood or district in which it chiefly lived; the two last names having reference to a considerable portion of that part of Italy, which was then

* Ergo duo genera sunt ovilli pecoris, molle et hirsutum. Columellæ lib. vii. cap. 2. Ovium summa genera duo, tectum et colonicum. Plin. Hist. Nat. lib. viii. § 72.

† Est et hirtæ pilo crasso in tapetis antiquissima gratia. Plin. Hist. Nat. lib. viii. § 73.

‡ Apulæ breves villo. Plin. Hist. Nat. viii. 73.

§ Ex omnibus Tarentinum est mollissimum. Columel. vii. 4.

‖ In ovibus pellitis, quæ propter lanæ bonitatem, ut sunt Tarentinæ et Atticæ, pellibus integuntur, ne lana inquinetur. Varron. lib. ii. cap. 2.

¶ Græcum pecus, quod plerique Tarentinum vocant. Columel. vii. 4.

denominated Magna Græcia, from the supposed origin of its inhabitants. This breed was also sometimes called "Asianum,"* probably from the opinion of its having been derived from Laodicea in Syria, where, according to Pliny, sheep of a similar kind existed in his time.†

The perfection of both these breeds seems to have consisted in certain common qualities. The ewe was to have a large carcase, capacious belly, short legs.‡ The ram a wide breast, shoulders, and buttocks, a long and deep body, and a broad and long tail.§ The fleece was to be thick, soft, and deep, especially about the neck and shoulders. It seems to have been with a view to the increase of wool on this finest part of the animal, that the Romans thought a long neck valuable in the ewes. The ears and forehead of the rams were to be involved in wool; and no individual of either sex was tolerated, of which the wool did not clothe the whole belly. Those which were defective in this valuable quality had the appellation of "Apicæ." Regard was also had to the horns. It is a memorable circumstance in these sheep, that the rams had generally horns, and the ewes none.‖ Of the horned rams, those which had them twisted and turned flat backwards or downwards were preferred, as being less dangerous than those in which they were prominent or spreading. Still, however, the knot, polled, or hornless rams, "mutili "arietes," were most esteemed.¶

It is impossible for any who reads this description, and who is acquainted with

* Græcas oves, sicut Asianas, vel Tarentinas. Palladii November. XIII.

† In Asia vero eodem genere Laodicea. Plin. Hist. Nat. viii. 73.

‡ De formâ, ovem esse oportet corpore amplo, quæ lana multâ sit et molli; villis altis et densis toto corpore, maxime circa cervicem et collum; ventrem quoque ut habeat pilosum. Itaque quæ id non haberent majores nostri apicas appellabant, ac rejiciebant. Esse oportet cruribus humilibus. Varron. lib. ii. cap. 2. Eliges ovem vasti corporis, cervice prolixâ, prolixi villi, nec asperi, lanosi et ampli uteri. Nam vitandus est glaber et exiguus. Columel. vii. 3. In ipsa ove satis generositatis ostenditur brevitate crurum, ventris vestitu. Quibus nudus esset, apicas vocabant, damnabantque. Plin. Hist. Nat. viii. 75.

§ Ex formâ, si arietes sint fronte lanâ vestiti bene—lanâ opertis auribus, amplis pectore et scapulis, et clunibus latis, caudâ latâ. Varron. ii. 2. Habitus autem arietis maximè probatur cum est altus atque procerus, ventre promisso atque lanato, densique velleris. Columel. vii. 3.

‖ Ovium nulla (cornua) nec cervarum. Plin. Hist. Nat. xi. 45.

¶ Tortis cornibus pronis ad rostrum. Varron. ii. 2. Intortis cornibus: non quia magis hic sit utilis (nam est melior mutilus aries) sed quia minime nocent intorta potius quam surrecta et patula cornua. Columel. vii. 3.

the improved Merino race of the present day, not to suspect that they are one and the same breed. Let us examine the evidence of this fact.

In the first place, there is not, so far as I know, throughout Europe, except in Italy itself, any breed of short-woolled sheep now existing besides the Merino, of which the males are horned, and the females not.

The sheep of Apulia and Calabria had anciently their summer and winter quarters, as in Spain. We are told by Varro, that their winter pastures were "a great "many miles distant from those of summer." "This," says he, "I know; for "my flocks which were summered in the Reatine mountains, were accustomed to "winter in Apulia." "Multa millia absunt sæpe hibernæ pastiones ab æstivis. Ego "vero scio; nam mihi greges in Appulia hibernabant, qui in Reatinis montibus "æstivabant."* Whether these pastures were the property of the flock-masters, or only hired by them, I have not been able fully to ascertain. They appear, however, to have been chiefly commons, on entering upon which the shepherd paid a tax collected by a publican, who set down the account in writing. Hence this land was called "Scripturarius ager." † Those who there depastured their sheep without this entry in writing, were subject to the penalty of the Censorian law.‡ It is true, indeed, that the Roman sheep, which habitually travelled, were the hirsutæ, or coarser-woolled; but one may easily understand how a custom widely spread in one country may, by communication, be introduced and perpetuated in another with regard to objects of a similar kind, though differing in some unimportant particulars.

It was universally the practice among the Romans to give salt, with a view to promote appetite and thirst, to increase milk, and to improve digestion, in their sheep.§ One can hardly believe that this practice, which still exists in Italy, should

* Varon. ii. 2.

† Scripturarius ager publicus appellatur, in quo, ut pecora pascantur, certum æs est: quia publicanus scribendo conficit rationem cum pastore. Sexti Pompeii Festi de Verborum significatione lib. xvii.

‡ Greges ovium longè abiguntur ex Apulia in Samnium æstivatum, atque ad publicanum profitentur, ne si inscriptum pecus paverint, lege Censoria committant. Varron. ii. 1.

§ Nec tamen ulla sunt tam blanda pabula, aut etiam pascua, quorum gratia non exolescat usu continuo, nisi pecudum fastidio pastor occurrerit præbito sale, quod velut ad pabuli condimentum per æstatem canalibus ligneis impositum, cum è pastu redierint oves, lambunt, atque eo sapore cupidinem bibendi pascendique concipiunt. Columel. vii. 3. Quin et pecudes, armentaque et

from time immemorial have found its way into Spain, and into that country only, except by immediate communication.

I have mentioned that the Spanish flocks are frequently led by goats. We find from Tibullus that this was a common expedient among the Romans.*

The dogs which follow the flocks in Spain are not intended, as in England, France, and most other European countries, to assist the shepherd in guiding and regulating the sheep; but are of a strong and fierce kind, serving to guard both against the depredations of wild beasts and robbers. So also the Roman dogs; the qualities, uses, and treatment of which are minutely described by Varro and Columella.† Exclusively of the sheep or goats expressly trained for the purpose of driving and restraining the flocks, the only means employed in both these countries were the voice and staff or crook.‡

It is certainly also chiefly for defence, that the Spaniards, like the ancient Romans, sometimes fold their sheep with strong nets. §

In some of these instances, there may have been coincidences of practice suggested by similarity of circumstances; but this could not have been the reason why, in order to avoid variegated fleeces in the offspring, both nations should exclude rams with spotted mouths or tongues from the privilege of breeding,‖ if, as Lasteyrie asserts, spotted lambs are not more frequently generated by such rams, than by those whose mouths and tongues are of one uniform flesh colour.

jumenta sale maximè solicitantur, multo largiore lacte. Plin. Hist. Nat. xxxi. 41. Pecus potu pinguescit: ideo sal illis aptissimus. Idem. x. 93. Salis tamen crebra conspersio, vel pascuis mista, vel canalibus frequenter oblata, debet pecoris levare fastidium. Pallad. November § xiii.

* Dux pecoris hircus: duxerat hircus oves. Tibulli lib. ii. el. 1. v. 58.

† Canis enim ita custos pecoris, ut ejus, quod eo comite indiget ad se defendendum. In quo genere sunt maximè oves. Has enim lupus captare solet, cui opponimus canes defensores. Varron. ii. 9. Alterum (canum genus) propellendis injuriis hominum ac ferarum; et id observat, domi stabulum, foris pecora pascentia. Columel. vii. 12.

‡ In cogendis recipiendisque ovibus adclamatione ac baculo minetur; nec unquam telum emittat in eas. Columel. vii. 3.

§ In saltibus quæ pascuntur, et a tectis absunt longè, portant secum crates, aut retia, quibus cohortes in solitudine faciant. Varron. ii. 2.

‖ Animadvertendum quoque linguane nigra aut varia sit; quod fere qui ea habent, nigros aut varios procreant agnos. Varron. ii. 2. Itaque non solum ea ratio est probandi arietis, si vellere candido vestitur, sed etiam si palatum atque lingua concolor lanæ est; nam cum hæ corporis partes nigræ, aut maculosæ sunt, pulla vel etiam varia nascitur proles. Columell. vii. 3.

There is another and a still more remarkable coincidence, I believe absolutely peculiar to the Merino breed; which is, the practice of killing a considerable number of the lambs very shortly after they are yeaned. This custom of the Spaniards I have already noted at length; and Columella is very minute in his description of it among the Romans, with whom the motives were exactly the same as with the Spaniards. "In this breed," says he, "there is little profit from the sale of the "lambs, and none from the milk of the ewes: for those lambs which ought to be "taken away, are generally killed a very few days after they are yeaned; and the "ewes, thus deprived of their young, give suck to the progeny of others. In fact, "each lamb is provided with two nurses, and ought to be robbed of none of their "milk, in order that it may grow the more quickly from plenty of food, and that "the dam, by the association of its fellow nurse, may suffer the less from bringing "up its young." "Minimus agnis vendundis in hac pecude, nec ullus lactis reditus "haberi potest; nam et qui submoveri debent, paucissimos post dies quam editi "sunt, immaturi fere mactantur, orbæque natis suis matres, alienæ soboli præbent "ubera. Quippe singuli agni binis nutricibus submittuntur; nec quicquam sub-"trahi submissis expedit, quo saturior lactis agnus celeriter confirmetur, et parta "nutrici consociata minus laboret in educatione fœtûs sui."*

This agreement in so many important particulars of form, fleece, constitution, and general treatment, proves, I think, beyond all reasonable doubt, that the present Merinos are the same as the ancient Tarentine sheep of Apulia.

In the southern parts of Italy sheep still exist, distinguished by different names; as "bianche gentile," fine-woolled white; "bianche di pelo lungo," long-woolled white; "nere gentile," fine-woolled black; "nere di pelo lungo," long-woolled black; "carfagne," "carapellese," &c. These appellations are evidently given from the colour, length, and other qualities of the wool; but whether among this number there are more than two really distinct breeds, I am unable to say. It seems, however, that about a million and a half of these breeds in Abruzzo and Puglia still make annual voyages, under regulations established by the government, which allows them salt, at half the current price, at the rate of about 54 or 55 pounds per thousand.†

* Columellæ vii. 4.

† See a long account of these sheep from Galanti's History of Naples, by Lasteyrie; Traité sur les Bêtes-à-laine d'Espagne, page 205.

If any of these sheep preserved the valuable qualities of their ancestors, the molles or Tarentinæ, they would probably be the Bianche gentile. But who is there, with knowledge sufficient for the investigation, that has ever made the interesting inquiry? The horn seems still to characterize the sexes; and, if we may judge from the pictures of Rosa of Tivoli and others, the Merino form remains. But, so far as we know, the delicate fleece has long given place, amidst the revolutions of government and taste, to other articles of clothing more appropriate to the feelings of a people fainting under the burning temperature of that southern clime. Accordingly we find, among their writers of the 11th and 12th centuries, little mention of woollen garments; while they abound with descriptions of those of cotton and silk, variously coloured, and embroidered with silver and gold.* At a somewhat later period, this sort of luxury had so much increased in Italy, that, about the middle of the 14th century, a thousand citizens of Genoa are said to have appeared in one procession, clad in silken robes.†

From these or other causes, the present Bianche gentile are said to bear little resemblance in their most valuable property to the oves molles of ancient Rome; having long suffered such a deterioration of fleece, probably from the admixture of the hirsutum or hardier breed, as to have descended even below the best of our native races.

But though it may with tolerable certainty be inferred, that the present Merino breed is similar to the fine woolled sheep of Italy, I can find no direct evidence of the time when they were first introduced into Spain.

About the beginning of the 14th century, Frederic, son of Peter the Third, King of Arragon, and first of that name of Sicily, who mounted the throne of Sicily on the accession of his elder brother James to that of Arragon, married Blanch, daughter of Charles the Second, King of Naples. About the same time Constantia, or, as others call her, Violanta, sister of Frederic, was united to Robert, King of Naples, son of Charles the Second. This double union of Italy with Spain, the first which I can trace in history, might possibly suggest and allow a reciprocal distribution of what was most valuable in each of those countries.

It is not, however, in Arragon, that we now find the best Merino sheep; and all the circumstances of the history of Spain would lead us to infer their introduction

* See Muratorii Antiquitates Italiæ medii ævi tom. ii. De arte textrinâ, &c.

† Robertson's Charles V. vol. i. page 400. 8vo.

there at a much more remote period than the year 1300. I have shewn the probability of their having existed in that country during the dominion of the rich, industrious, and luxurious Moors: and when we consider that, in still earlier times, when Spain was under subjection to Rome, it contained 600 cities, exported annually to the capital 10,000 pound weight of gold, and, in proportion to its extent, was, probably, the richest province of that vast empire, we can hardly avoid concluding, that, at some period of its dependence, it obtained from Italy, among other means of enjoyment, this precious race of sheep.

CHAPTER IV.

Establishment, Treatment, and Produce of the Merino Breed in Sweden, Denmark, Saxony, Prussia, Silesia, Hungary, Austria, Anspach, Bayreuth, Wirtemburg, Mecklenburgh, Zell, Brunswick, Baden, the Palatinate, Holland, Piedmont, France, Geneva, Russia, Cape of Good Hope, New Holland, Great Britain, Ireland.

THE first nation in Europe which has imported, with a view to naturalize, the Merino race of sheep, is Sweden. Of this country, the most northern part is burnt up, during a short summer, by a sun which, for many days, never sets; and the whole is desolated by a winter of seven or eight months, during which brandy freezes, and the ground is covered with uninterrupted snow. Notwithstanding these inauspicious circumstances, M. Alstroemer, in the year 1723, introduced into Sweden a flock of Merino sheep, from the warm vallies of Spain. Under his direction, the Government instituted a school of shepherds, in 1739; and, soon afterwards, granted bounties of 25 per cent. to all the venders of fine and good wool. These bounties were successively reduced to 15 per cent. in the year 1781; and to 12 per cent. in the year 1786; and, in 1792, their object having been answered, were wholly discontinued. The bounties so distributed amounted, in all, to between fifty and sixty thousand pounds sterling.

In the year 1764, there were in Sweden 65,369 sheep of the pure breed, and 23,384 crossed with them so deeply as to produce fine wool. It is supposed that of the former there are now at least 100,000, or about $\frac{1}{25}$ of the total number of sheep in Sweden. The wool of the descendants of this primitive flock is, in

every respect, fully equal to that of Spain. Those sheep, which have been neglected, have degenerated in point of size; but all which have been attended to, and well managed, have become larger than the parent stock. The wool produce has proportionably increased; so that, occasionally, a ram's fleece in the yolk has weighed between 13 and 14lbs.

Mr. Schulz has, in the province of Upland, a flock, the progenitors of which came from Spain, about the year 1747. In order, if possible, to improve their wool, he imported afterwards from Spain, at six different times, new rams, chosen with great care by his nephew, Mr. Gahn, Swedish Consul at Madrid. The result was, that all these rams, except those of the last importation in 1778, were found to have wool inferior to that of his own flock.

It should seem that, at present, the Swedes raise in their own country nearly as much fine wool as is sufficient for their manufactures; and, therefore, use little of that which is grown in Spain.

The more attentive cultivators in Sweden lodge their sheep, during the whole year, in large and airy houses, the windows of which are always open during the day, and which, in fine weather, are shut up with hurdles instead of doors. Even in the severest part of the winter, they drive them out twice a day for the sake of air. In the winter, which continues at least seven months, they feed them in the house, allowing six feet by five, or, more usually, six feet square, to each sheep. They give each, daily, something more than two English pounds of hay, with an addition of dried leaves of birch, willow, maple, alder, ash, elm, oak, &c.; the leaves and stalks of the hop; pease haulm, and barley or oat straw. The straw and leaves are often moistened with the grains and liquid left after the distillation of brandy. Sometimes they add a few oats, or the refuse of wheat. They find that leaves, when given in a small proportion, are a healthy sort of nourishment.

During summer, the sheep are kept in the day time in the fallows, the stubbles, or natural or artificial pastures, in which they are defended from the heat of the sun by the shade of trees. If these are wanting, the sheep are turned under the floors of the sheep houses, which are always raised some feet above the ground. The Swedes have invariably found that extreme heat is more injurious to these animals than great cold. Every night during the summer they are housed, partly by way of security against the wolf and the lynx. They drink every day of running water. Those of Baron Schulz are taken out to water twice a day during the coldest season.

The Swedes consider salt as very wholesome for sheep. They allow it them chiefly in damp or rainy weather, occasionally mixing with it wormwood and other bitter plants, juniper berries, and even tar. The plants and berries are powdered, mixed in water with the tar and salt, and put into troughs, across which are nailed, at proper intervals, branches of fir, in order to prevent the sheep from jumping in, or soiling themselves.

The shearing takes place about the beginning of July; previously to which the sheep are washed, by some in running water, by others in buckets of warm water, mixed with a small quantity of alkaline lye, and of urine; after which they are rinsed with clean water. Two or three days, or more, are suffered to elapse before shearing, in order that the wool may dry, and become soft by a fresh rise of the yolk. The average weight of the well washed ewes' fleeces seems to be full three pounds, and of the lamb's fleeces one pound.

The Danes, about the year 1789, carried from Sweden some Merino sheep; a few of the descendants of which still remain, and give good wool.

In 1797, the government of Denmark imported from Spain 300 sheep, which were placed at Esserum, eight leagues from Copenhagen. This flock was composed of all the best breeds in Spain, as those of the Escurial, Guadaloupe, Paular, Infantado, Montasco, and Negrette. Only two of this number had died, when they were seen by M. Lasteyrie eighteen months afterwards.

The flocks were under the care of M. M. Nelson and Wiborg. They are kept in airy houses, with separate divisions for the rams, ewes, and lambs, and outlets into corresponding yards; and they are fed in the house with hay, or rye and oat-straw, which are cut into chaff. This last practice is common in the north of Europe. At the beginning of the winter, they are almost wholly fed with straw and the leaves of trees; and about the first of January, they begin to have one meal of hay. They are fed thrice a day, and have each about $3\frac{1}{4}$lb. of dry food per diem. In warm weather, they are sent out into inclosed pastures without a shepherd; and on the commons are driven with a tame bell-wether, instead of a dog. When the rains are violent, they are kept night and day in the house, which is well cooled by thorough air. On other occasions, except when the snow is very deep, they go out every day into the inclosures. Salt is given them, especially in wet weather, or when they begin to exchange green for dry food. Some persons give them the heads of salt herrings, or the brine which has been used for pickling

meat or fish. The lambs are weaned at three months, and immediately put into the best pastures.

In the year 1765, Augustus Frederick, Elector of Saxony, introduced into his dominions from Spain 100 rams and 200 ewes, chosen from the most noted flocks. Part of these were established at the Electoral farm at Stolpen on the frontiers of Bohemia, six leagues from Dresden. Three other secondary sheep-farms were instituted, at Rennersdorf, Lohm, and Hohenstein, in order chiefly to improve the native breeds by the Spanish cross. At the end of ten years, these establishments were found to have had all possible success. The sheep of the pure blood had preserved every valuable quality, and the ultimate crosses had wool fully equal in fineness and beauty to that of the pure Merinos.

In 1776, they began to offer some of these sheep for sale. But as, at this period, they found many difficulties, the government obliged the tenants of the electoral lands to buy a certain number of the Spanish sheep. The demand for them soon increased to such a degree, that, in 1778, it became necessary to make a new importation from Spain, to the amount of 100 rams and 200 ewes. The flocks of Stolpen, and the three others abovementioned, have been successively augmented, so that, according to Lasteyrie, the pure Merinos belonging to the Elector amounted in 1802 to 3,400; and 500 of this flock annually disposed of by public sale, are insufficient for the demands of the farmers, notwithstanding the addition of those which are easily procured from private individuals.

The sheep of these flocks are larger or smaller, and yield more or less wool, according to the nourishment which is given them, and the mode in which they are treated. On the whole, they are smaller and less productive than the original ones in Spain. The Saxon Government, aware of this, has established public schools for shepherds, and distributed among the country people several publications, containing useful instructions for the treatment of sheep.

The winter food of the Saxon Merinos consists of hay, lattermath, clover, oat or rye-straw, haulm of peas, vetches, lentils, &c.; which are distributed twice or thrice a day, according to their quality. Some cultivators give oil-cake, and bran or corn bruised or ground into meal. They mix these articles in a tub with the water which they give the sheep to drink, and afterwards divide among them the more substantial sediment. This mixture, which they find singularly beneficial to the lambs, should be made with hot water; and seven or eight pounds of cake or

meal are divided among 100 sheep. When they have no good fodder, or the snow continues very long, they give the sheep corn in the straw, or even by itself; but as the latter food is expensive, they usually substitute beet-root, turnips, carrots, and more especially potatoes. They collect with great care the horse-chesnut, which they begin to give in the autumn, as soon as the grass fails, allowing each sheep about 1¼lb. of the nut and its thorny husk, which they cut in pieces together. Sheep, as well as cows, refuse this sort of nourishment at first, but come, at length, to eat it very greedily. When the weather will permit, and the snow is not too deep, they send the sheep into the woods, and on the dry heaths; but those who have no winter pastures keep their sheep in the house from the beginning of December till the beginning of April, taking care to give them as much air as possible within, and to send them out, for the same purpose, three or four hours every day. Some persons, through defect of pasture, also keep them in the houses the whole summer; and, if they allow them plenty of air and good nourishment, do not find this mode of treatment prejudicial either to their health, or the fineness of their wool.

It seems as if, even in summer, the whole flock was housed at night; and they are not sent out into the pastures till after the dew is dissipated. They are kept within in thick fogs, in hard rains, and after hail storms. Water is given them every day.

Salt is generally distributed to these sheep by the Saxons, who think that it contributes alike to their health, and the fineness of their fleeces. They either mingle it with their forage, or dissolve it in their drink. Sometimes it is mixed with hay seed, millefoil, bitter plants, and a small quantity of wood ashes. It is given chiefly in the summer, and dry weather; but is discontinued to the ewes four or five weeks before lambing time, from a belief that the thirst which it occasions causes them to drink so much water as to obstruct their yeaning, and that their relish for it makes them neglect to lick their new-born lambs.

The lambs, fall before March, and are weaned in June. With some few exceptions, they are not allowed to accompany their dams to the pastures before that time. Some persons even keep them in the house till autumn; and others during the whole of the first year. But then they give them there plenty of hay, lattermath, peas haulm, bruised oats, or peas, &c. They are thus imprisoned with a view, it is said, of securing them from giddiness. If any ewe has twins, one

of them only is suffered to suck her, and the other is put to a she-goat. It is said that the milk of this animal is peculiarly nourishing to weak and sick lambs; for which purpose goats are kept in some flocks.

The sheep are washed before shearing in running water, two successive days; on the morning of the first day, and on the morning and noon of the second. They are suffered to dry for two days, and are shorn on the third. The time of shearing is the beginning of May. When the skin is accidentally cut, the wound is rubbed with sheep's dung, or with a mixture of linseed oil and resin. Both practices are probably intended to guard against the fly.

Saxony no longer imports Spanish wool. It is supposed to contain between 90 and 100 thousand fine-woolled sheep; each producing, on an average, $2\frac{3}{4}$lb. of washed wool; altogether 247,500lb. or upwards of 1031 packs of 240lb. each. At least half of this quantity is sent from the Leipsic fairs to various parts of Europe.

A good deal of this wool has of late been imported into England. Till the present year, it came in a very foul and rough state, being probably, as Lasteyrie says, not sorted, as in Spain, but only freed from that part which was soiled by the excrements. Hence it wasted in scouring from five to six pounds in twenty. This year, however, it has come much more nicely sorted, neatly packed, and washed in some improved method. It is now generally agreed by the manufacturers who have tried this wool, that it makes cloth superior in softness and fineness to any which can be obtained from the very best Spanish piles.

The Merino breed of sheep was first introduced into Prussia by M. Finck; who began, in 1768, with buying rams and ewes from Saxony, and afterwards, in the year 1779, imported three rams and 20 ewes of that race directly from Spain. The fleeces of this flock have preserved to this day their original fineness.

In the year 1786, Frederic the Second also procured from Spain 100 rams and 200 ewes. For want of due care, the greater part of these royal sheep died, or have left degenerate issue. Some flocks, however, derived from this stock, still remain, and preserve all the original excellence of the fleece.

M. Finck, though he has carefully maintained the pure race, employed his rams chiefly for the purpose of improving the native breeds. His flocks are three leagues from Halle, and consist of sheep, which are somewhat smaller than the unmixed Merinos, but are altogether equal to them in beauty and fineness of wool.

Lasteyrie says that, in the year 1802, M. Finck was gone into Spain to purchase, on account of the Prussian government, 1000 Spanish sheep.

The Comte de Magnis has also at Eckersdorff, in Silesia, a flock of upwards of 9000 sheep, improved by the Merino cross. His object, of late, has been to unite size with fineness of wool; for which purpose he has mixed the best Merino rams, which he could purchase at any price in Saxony, with the large breeds of Hungary. In this respect he has already made great progress; so that, throughout the greater part of his flock, he has nearly equalled the best wool of Spain, on a carcase stronger, larger, and better formed than any fine-woolled sheep on the Continent. One sheep with another gives about 2lb. 15oz. of washed wool.

M. Finck, having no winter pasture, keeps his flock of seven or eight hundred sheep in the houses and yards from the end of November to the end of March. He there gives them hay, lattermath, and thrashed straw of wheat, rye, barley, oats, and peas; which he varies as often as possible, in order to gratify the taste and appetite of the sheep. He never allows them corn or unthrashed grain, except in very long winters, or when the straw fails; and then only to the rams at the time of service. Oat straw is generally looked upon as too coarse and dry for food; and the haulm of peas is preferred to all other straw, when the stalks and leaves are still somewhat green, but is good for little when the stalk is black, and the leaves fall off in thrashing.

During frost, while the ground is free from snow, the flocks are driven in the day time to the wheat and rye fields; and then have no other food, besides some straw in the house at night. The rams are fed with hay twice a day, and straw of corn once; or once with hay, once straw, and once pease haulm. They have for drink water, in which oil-cake is mixed, having been previously steeped. The lambs of one year old have, twice a day, hay or lattermath, and once pease or corn straw; or else once hay and twice straw. They have likewise oil-cake mixed with water in the proportion of 7 or 8lb. of cake to 100 lambs. The ewes in lamb have daily one meal of pease haulm, and two of corn straw; or two of pease haulm, when that kind of food is sufficiently abundant. When fodder is bad, or scarce, oil-cake is mixed with their water, in the proportion of 6 or 7lb. to 100 ewes. Three or four weeks before lambing time, they have uniformly this kind of drink, together with a meal of hay, instead of one of straw. At lambing time, and while giving suck, they have two meals of hay to one of straw; and the same kind of

drink, with the addition of from 6 to 8lb. per 100 ewes, of meal of kidney beans, peas, rye, or barley. The wethers and barren ewes are fed with peas haulm and wheat straw, in proportions similar to those above specified. They have never any hay, and are daily supplied with 5 or 6lb. of oil-cake per 100, when the snow prevents their feeding on the young wheat or rye,

The ewes yean from the middle of March to the middle of April. They are then, every morning and afternoon, taken from their lambs to the pastures. The lambs, therefore, suck them only at mid-day and at night; and, at the latter time, have some lattermath given them. When the weather permits, they go to their own appropriate pastures. In this method they are found to succeed better than when they constantly accompany their dams. In summer M. Finck sends them to the fallows, grass-lands, clover, &c.

He does not think salt necessary for sheep; and only gives them a small quantity of it in the evening, when he observes them licking the saline efflorescences, which appear on the walls. After this allowance, he debars them from all drink, and from moist pastures, the following day.

Most of the farmers in Prussia allow their sheep to go out during the day, though the ground is covered with snow. They give them reeds, principally the arundo angustifolia, whether green or dried; which, in the winter, they find to be a very œconomical and wholesome food.

The winter in Silesia continues from October till the end of April. The Comte de Magnis, by having almost entirely discarded fallows, has been able to raise, on land far from naturally productive, such a quantity of clover, lucerne, potatoes, and other artificial food, as is sufficient to supply his large flocks during this inclement season. The following is the order of his culture: first year, oats; second, potatoes; third, oats or barley, with mixed seeds of clover, lucerne, tall oat grass, meadow soft grass, burnet iron wait, and burnet; fourth year, two cuttings of hay from the above plants; fifth, and following years, according to the produce, the same fields in pasture. After mowing, he calculates the exact quantity of his winter food, and the proportion in which each should be distributed to his flock; of which the sale sheep, the rams, the nursing ewes, the shearlings and lambs, are kept in separate classes. Accordingly, in each division of his sheep-houses he fixes up tables, on which are specified the quantity and quality of each sort of food, and the hour at which it is to be given.

To 125 male lambs he distributes,

			lb.
1st at 6 in the morning	Clover and chopped straw	equal parts weighing English about	87¼
2dly at 10	Ditto	Ditto	87¼
3dly at 1 in the afternoon	Hay		67½
4thly at 4	Chopped straw		52½
	Potatoes		130¾
5thly at 6	Chaff of corn		100¼
			525½

Which makes nearly 4¼lb. per diem to each lamb.

To 100 ewes,

			lb.
1st at 6 in the morning	Clover and chopped straw; the former being about ⅓		75¾
2dly at 10	Ditto		75¾
3dly at 1 in the afternoon	Clover		109
4thly at 4	Chopped straw and Potatoes		157
5thly at 6	Chaff of corn		81¾
			498¼

Which amounts to nearly 5lb. each daily.

The proportion of food to each chilver lamb is about 4lb. and to each ram and wether nearly 6lb.

The Comte de Magnis never gives his sheep corn, which he considers as too expensive. He looks upon potatoes as equally beneficial with oats, and four times as cheap. His sheep eat, during the winter, as much salt as they choose; which amounts to nearly 2½ hundred weight to each 100 sheep.

His flock, before shearing, is washed according to the common method of the country; which consists in making them leap from a low bridge, and swim across a river.

The war with Austria prevented M. Lasteyrie from visiting that country, and some other parts of Germany; and, therefore, caused a dearth of information respecting their Spanish flocks. He tells us, however, that the Empress Queen Maria Theresa exported from Spain, in the year 1775, 300 Merinos, which were placed at Mercopoil, in Hungary, where a school for shepherds was founded, and instructions published for the treatment and improvement of the fine-woolled breed.

Subsequently to that period, two other flocks, of from three to five hundred each, have been brought from Alicant to Trieste. The first of these was about the year 1782. In 1802, a person was in Spain, employed by the Emperor to purchase eight or nine hundred Spanish sheep. Great pains have lately been taken by the government to diffuse the benefits arising from that breed, and to disseminate instructions for their improvement, and preservation from infectious and other diseases. The administration of salt, in damp and cold weather, forms a part of these instructions.

In the Margraviates of Anspach and Bayreuth, attempts were made to improve the native sheep, by instituting a school for shepherds; and by introducing, in 1788, 40 rams and some ewes, of the Saxo Spanish and Roussillon breeds. In 1790, a second flock was imported from Spain and Roussillon, and placed at Rolenhoff. At present few flocks exist in the country, which have not begun to be improved by these importations. There were, in the year 1797, at the sheep-yard of Rolenhoff, 425 sheep of the pure breed; and, in the two Margraviates, 8191 improved by crossing. The government has taken pains to inform the flock-masters where they may obtain the best rams, and assists them in the sale of their wools.

In 1786, the Duke of Wirtemburg procured 100 rams and ewes from Spain and Roussillon; and, in 1787, 40 Spanish, and 25 Roussillon sheep. This flock was placed at Justingen, and, in 1802, amounted to more than 500. Part of them are every year sold. Thirty-two of this breed were given by Moreau to the agricultural Society of Strasburgh.

M. de Molk has a large flock of Merinos in Mecklenburgh; and the agricultural society of Zell possesses one of a mixed breed, the wool of which has reached its utmost degree of fineness.

Some Merino sheep, introduced into the duchy of Brunswick in 1783, and into the Margraviate of Baden in 1788, have improved the wool of those countries, of the Palatinate, of Hanover, &c.

Few countries appear less adapted to the support of sheep than the rich and marshy soil of Holland; notwithstanding which, M. Twent, in the year 1789, imported from Spain two rams and four ewes, which he placed on his estate at Raaphorlt, between Leyden and the Hague. Part of this estate is sandy and unproductive, part meadow or arable, and the rest coppice or timber. In the year

1792, he imported from Spain 3 new rams and 4 ewes. His flock, in 1802, amounted to 200, which were all that the land could maintain. M. Twent every year sells the sheep which he draughts. His rams' fleeces weigh, unwashed, from 10 to upwards of 14lb. each; and those of his bearing ewes from 6 to nearly 10lb. In scouring they lose half their weight. In order to prove the fineness of his wool, he placed on a piece of black cloth nine specimens of the wool of his young rams by the side of the best specimens of superfine Spanish wool which he could procure from a clothier; and having numbered them, and marked the origin of each specimen, so as to correspond with a number in a sealed paper, he sent them to a merchant who bought his wool, requesting him to note those which he thought best. The numbers in the sealed paper being compared with the clothier's marks, it was found that five of M. Twent's specimens had been judged superior to the superfine Spanish.

In the year 1792, M. Cuperus procured from Spain some Merinos, which are kept on the moist and fertile meadows near Leyden. His crosses of the native breeds were, in 1802, nearly equal to the unmixed Spaniards in fineness of fleece.

From these sheep have descended several mixed breeds, in the possession of M. Twent, M. Kops, near Harlem, and M. Collot, near the Hague. They have been principally derived from Texel and Friesland ewes; both of which are long-woolled, large sheep, and the latter, probably, the largest in Europe. M. Kops had, in 1802, reached as far as the third generation; and the wool of the mixed race of M. Twent was even superior in fineness to that of the pure Merino.

M. Twent's sheep feed, during the summer, either on the downs, where the herbage is very short and poor, or in the low lands, which are either meadow or arable, or woods of alder, oak, or elm; all intersected by ditches, which receive the water that drains from the soil. They are also fed on the highways. During the extreme heat of the day they are housed; and are never suffered to remain abroad during the night. To this precaution, rather than to a cause assigned by M. Twent, it is possibly owing that the Merino race seems to contract from the moist soil of Holland neither the rot, nor any other disease. We are told that these sheep are less subject to the former malady than those of Friesland and the Texel.

During the winter they are driven out to feed every day, except when the

ground is covered with snow ; and they are fed in the house, exactly as the native breeds, with hay, beet-root, turnips, beans, and oats; and take fat just as readily.

It is related as a curious fact, established by M. Twent, from the observation of twelve years, that the leaves of the alder are particularly relished by the sheep in rainy weather; and as, when eating this food during such weather, they escape the rot, though feeding on the most marshy soils, it is inferred that their preservation is owing to this cause.

M. Twent never gives salt to his sheep; and folds them for some months.

Piedmont seems to have first introduced the Spanish breed of sheep in 1793. The ewes consisted of 150, chosen from the best Segovian flocks, by Prince Masserano. Part were placed on the domain of La Mandria, and part given up to other proprietors. Notwithstanding the war which existed at that time, and which threatened the entire destruction of this flock, they increased, dispersed as they were, to about 5000, of which $\frac{1}{3}$ were of the pure blood, and the rest crosses from the ewes of Germany, Rome, Naples, and Padua.

Under these circumstances, the greater part of the proprietors agreed to form a society; and, about the year 1801, obtained from the government of France, to which Piedmont was then annexed, a grant to improve, under certain conditions, the domain of La Mandria. They began with 2000 fine-woolled sheep; which they engaged to increase to 6000, and were to dispose of their spare rams for the benefit of private individuals. Various laws were drawn up for the regulation of the flocks of this society, which may be seen by consulting M. Lasteyrie.

Besides these sheep, M. Collegno has a very fine flock of 1500. These, added to 3000 of the society of La Mandria, and 500 in the hands of other proprietors, make up the 5000 specified above as having existed in Piedmont in the year 1802. The pure Merinos of this flock exceed the native Spanish one or two inches in height, and produce, on an average, upwards of $9\frac{1}{4}$lb. of wool in the yolk ; which is fully equal in every good quality to that of the original race. Some of the ewes' fleeces have reached 13lb. and of the rams' nearly $17\frac{1}{2}$lb. each. We are not told what they lose in scouring.

The farm of La Mandria has about 800 acres of land surrounding the sheep-houses, which furnish food for the flocks from the end of October till about the middle of June. They are then driven to the Alps, where they get a fresh spring of good grass. All but the lambs are shorn before their journey. The rams continue

with the ewes forty days, and are then formed into a separate flock. The former are not used till their third year; the latter in their second. The ewes yean in December. They are seldom folded, except in the mountains; experience having shewn that their dung in the house is more profitable, provided they are supplied with a proper quantity of straw. When the earth is covered with snow, or the pastures fail, they are fed in the house with nothing but the best lattermath hay. Each lamb sucks only its own dam. They lie apart at the end of forty days from their birth; but are not weaned till some time before they go to the mountains.

There is no country in Europe which, of late years, has taken so much laudable pains in cultivating the Merino breed of sheep as France.

From a French work, entitled "La nouvelle maison rustique," published at the beginning of the last century, it appears that Spanish sheep had, at various times, been imported into France, even at that early period.

The first person, however, who paid any systematic attention to the improvement of the wools of that country, by this method, was Daubenton; who, about the year 1776, obtained a part of the 200 Merinos, which were imported by M. Trudaine, intendant of the finances. This flock of Daubenton, which was originally situated at Montbar, is now at Tanlay, in the possession of M. Thevenin; and, together with the descendants of 40, procured at the same time by Barbençois, and now at Villegongis, is all which now remains of the importation of M. Trudaine. The wool is of the very first quality; but the sheep at Villegongis, in consequence of want of food, are said to have degenerated in point of size and form.

In the year 1786, according to Lasteyrie, or in 1785, according to Bourgoing, who asserts that they were obtained through his mediation, 367 Merino sheep were presented by the King of Spain to Louis the Sixteenth. During their journey, 60 died; and within a few weeks after their arrival at Rambouillet, 35 ewes and 60 lambs fell a sacrifice to a febrile disease, accompanied with pustules, and which, as I have before remarked, is unknown, I believe, in England, called by the French Claveau, Clavelée, and sometimes Pourriture.

These sheep, having been chosen for their form and fineness of fleece from various Spanish flocks, differed extremely as to their size and shape; but, being properly associated after their arrival in France, produced a race unlike any of the original breeds, but equal to the best of them in mould and fineness of wool; and, as will hereafter appear, superior in weight of carcase and of fleece.

At the beginning of the French revolution, the Rambouillet flock was placed under the direction of an agricultural committee, consisting of Messrs. Bertholet, l'Heritier, Cels, Vilmorin, Dubois, Gilbert, Huzard, Parmentier, and Rougier-Labergerie; to whom was afterwards added M. Tessier. To the last of these gentlemen, in conjunction with M. Huzard, has of late devolved the office, at first executed by Gilbert, of presenting to the Class of Les Sciences, &c. of the National Institute an annual report of the state of this flock. M. Lasteyrie has given extracts from these reports from the years 5 to 10 (1797 to 1802) inclusive. From these it appears, that, in 1797, the average weight of the fleeces in the yolk was 3 kilogrammes, 3 hectogrammes, or about 7lb. 8½oz. English, without reckoning that of the bellies and tail; that the average price of the fleeces as above, was 4s. 2d. that of the rams 2l. 19s. 2d. and of the ewes, 4l. 9s. 2d.; and that the greatest price of any sheep was 8l. 5s.

In the report of the same flock, for the year 1802, of which but few particulars are given by Lasteyrie, it is said that the medium weight of the fleeces of full-grown nursing ewes of all ages, was 3 kilogrammes, 680 grammes, or about 8lb. 7oz. English; that of the ewes of 3 years old, which had not had lambs, 4 kilogrammes, 284 grammes, or about 9lb. 13oz. each; of the 2-tooth ewes, not shorn when lambs, 4 kilogrammes, 606 grammes, or about 10½ lb. each; of the rams of 3 or 4 years old, 5 kilogrammes, 975 grammes, or about 11lb. 5¼oz. each. The medium weight of the fleeces of 84 rams and wethers, and of 219 ewes, in all 303 fleeces, was 4 kilogrammes, 557 grammes, or 10lb. 7oz. English. The weight of some of the rams' fleeces was nearly 8 kilogrammes, or 18lb. 5¼oz. each. Notwithstanding this astonishing weight, it is said not to have included that of the belly, legs, and head of the sheep, which weighed, on the average of each animal, 366 grammes, or nearly 13½ ounces. The wool of this flock appears, from these reports, to waste, all parts included, more than ⅔ in scouring; and the superiority of weight of the fleeces in the year 10, is partly attributed to their having been then imbued with an unusual quantity of yolk. Each fleece sold, on an average, at the increased price of about 1l. 3s. 4d. sterling.

Of the sheep disposed of at the public sale in that year, 59 were rams, and 97 ewes. The lowest price of a ram was 13l. 2s. 6d. and the highest 26l. 5s. The lowest price of an ewe was 7l. 13s. 4d. and the highest 14l. 17s. 6d.

In order to afford the means of judging of the improvement of this flock, both

in quantity of wool and size of carcase, we are told, that while the best nursing-ewes, of the new importation in 1800, mentioned above, and amounting to 30, under various favourable circumstances, and bearing fleeces of 13 months, produced only $99\frac{1}{2}$ kilogrammes of wool, or about $227\frac{3}{4}$ lb. English, the same number of the nursing ewes of the improved Rambouillet breed, yielded in 12 months, and with worse keep, $115\frac{1}{2}$ kilogrammes, or about 264lb. $5\frac{1}{4}$oz. English; which makes a difference of 1 lb. $3\frac{1}{2}$oz. each fleece.

The sheep were, at the same time, considerably increased in size. The 3 largest rams and ewes of each sort being weighed, it was found that the weight of the rams descended from the first importation exceeded that of the second, 13 kilogrammes, 667 grammes, or about 31 lb. $8\frac{1}{4}$ oz. each; and that of the ewes 12 kilogrammes, 900 grammes, or 28 lb. $5\frac{1}{2}$ oz. each. The average height of the rams from the first importation exceeded that of those of the second 8 centimetres, or 3.1656 inches English; that of the ewes 3 centimetres, or 1.1871 inch. In length (probably from the nape of the neck to the root of the tail) the difference of the rams was 13 centimetres, or 5,1441 inches; and of the ewes, 22 centimetres, or 8.7054 inches. In girt, round the largest part of the carcase, the superiority of the rams was 4 centimetres, or 1.5828 inches; and of the ewes 14 centimetres, or 5.5398 inches.

I have seen several specimens of the Rambouillet wool of 1802, and possess some from the same flock obtained for me by a near relative from M. Lasteyrie. As far as I can judge of them by the naked eye, they are equal to the R. wool of the Spanish piles.

It appears from my former quotation, that the wool bears at least as great a price as that of the Spanish in the yolk, in France; and all the trials of it in cloth, casimir, &c. have proved it to be in no respect inferior in quality.

A school for shepherds has been established at Rambouillet, to which young men are sent for instruction from the different departments in France, and from private persons. For this privilege each pupil pays thirty shillings per month.

Besides that of Rambouillet, there are two other national establishments of Merino sheep in France. One of these is at Pompadour, formed in 1798, from a colony of the Rambouillet flock, composed of 70 ewes and 10 rams. In 1802 this flock had increased to 249 sheep and lambs. The other establishment of Merinos is at Perpignan.

It is not generally known in this country that, by a secret article in the treaty of Basil, the French Directory had stipulated for itself the privilege of purchasing in Spain, during each of five successive years, 1000 ewes and 100 rams. Several years elapsed before France availed itself of this power. But, at length, about the year 1799, or 1800, 1000 sheep were purchased in Spain by Gilbert, who died before he had farther accomplished the object of his mission. Of these sheep, which did not arrive in France till after his death, 360 were placed, at the national expense, at Perpignan; and, in 1801, had increased to 735. The remaining 640 were distributed among different persons, who had become subscribers to the fund proposed by the government for that purpose. After that period, the agricultural society of the department of the Seine petitioned the government to allow them the power of obtaining, by a subscription among themselves and others, the 4400 Merinos still due from Spain by the treaty of Basil. Their petition was granted; and two agents and several shepherds were sent into Spain in order to select and conduct the whole number. Of these, 1200 arrived in France in the year 1802, and were variously distributed. The remaining 3200 were to be purchased as quickly as the Spanish government would permit.

Among the detachments from the Rambouillet flock, none is more justly intitled to general notice than that of M. C. Pictet, of Geneva, who, in the year 1800, purchased 12 ewes in lamb, and in 25 days conducted them safely to Lancy, the place of their destination. Of some of his ram-lambs I have already mentioned the progress in weight. The proportions of a ram some days before shearing were as follows: Height of the fore-shoulder, inclusive of wool, 27 inches 3 lines French; or 29 inches $3\frac{1}{4}$ lines English: Length, from the root of the horns to that of the tail, 3 feet 6 inches; or 3 feet 8 inches 10 lines: Greatest circumference, 3 feet 11 inches; or four feet 2 inches $2\frac{1}{5}$ lines. Weight, 113 lb.; or, 123 lb. $2\frac{3}{4}$ oz. English. The height of an ewe was 24 inches 9 lines, or 26 inches $5\frac{1}{5}$ lines English: Length, 3 feet 2 inches; or 3 feet $4\frac{1}{2}$ inches: Circumference, 3 feet $8\frac{1}{2}$ inches; or 3 feet 11 inches, $6\frac{1}{3}$ lines. Weight 67 lb.; or 73 lb. English. The proper medium live-weight of M. C. Pictet's ewes is said, afterwards, to be from 80 to 95 lb.; or, from 87 lb. 3 oz. to 103 lb. $8\frac{3}{4}$ oz. English; while of the ewes last imported from Spain to Perpignan, only one reached 90 lb.; or, 98 lb. $1\frac{1}{2}$ oz. The average weight of the unwashed fleeces is said to be 6 lb; 6 lb. $8\frac{1}{2}$ oz. English; and the weight of that of the ram above-mentioned $11\frac{1}{2}$ lb.; or, 12 lb. $13\frac{3}{4}$ oz. English.

The 2-tooths, unshorn when lambs, give more than 9 lb. or 9 lb. 13 oz. English, of unwashed wool. One of his rams, of the same age, sold to M. Lullin, produced a fleece of 13 lb. 5 oz.; 14 lb. 13 oz. English. The loss in scouring is said to be three-fifths.

After the period above specified, M. Pictet augmented his flock by two farther draughts from that of Rambouillet; so that, in 1802, his whole number amounted to 9 rams and 98 ewes. He asserts that his wool is finer than any which he had seen from Spain, or other parts of France, and more especially than that of the sheep last imported by Gilbert. I have in my possession several specimens of M. Pictet's wool, with which I have been favoured by Thomas Poole, Esq. of Nether Stowey, in Somersetshire. One of them, which is that of a ram, is, I think, fully deserving of the praise which he gives it, and is probably superior to any which I have been able to procure from Spain.

Besides these, and several other French flocks of pure Merinos, there are many of the mixed breed. One of the most remarkable of these is the national flock of Alfort, which was originally situated at Sceaux, and afterwards at the farm attached to the Menagerie at Versailles; from whence it was finally removed in 1800, when that farm was given by the government to the Abbé Sieyes. This institution was formed for the express purpose of trying the result of crossing various ewes with Spanish rams. The ewes were those of Bearn, the Valais, Beauce, Boulogne, Lincoln, Sologne, and Roussillon; of which the third, sixth, and seventh, were short-woolled, and the others of the long-woolled kind.

At Alfort, as at Rambouillet, there is a school for shepherds, sent by the departments, or by individuals; by the farmer at the rate of thirty shillings per month each person, which includes board, lodging, clothing, instructions, books, and instruments. Private persons pay about 18*s.* 6*d.* per month for board, besides lodging, &c. The course continues for a year, and includes the anatomy, natural history, and physiology, nature and cure of diseases, mode of feeding, and other treatment of these useful animals.

Monsieur Chabert, at the veterinary school of Maisons, at Charenton, has a private establishment, chiefly appropriated to experiments of a similar kind, which he has prosecuted with equal ability and success.

The general result of all these experiments is said to be, that, with due care, the wool, in every breed of sheep, is capable of arriving at a degree of fineness fully

equal to that of the Merino. This effect is produced by constantly crossing with the finest woolled rams; and, under that condition, is generally obtained sooner or later, according to the fineness of the fleece of the ewe; but, according to these writers, in no breed later than the 4th cross. The finest wool of the cross-breeds does not waste more than three-fifths in scouring. On this subject I shall have occasion to speak more fully in a subsequent part of this essay.

We are told by Lasteyrie, that, in 1799, there were 500 flocks of French sheep crossed with Spanish rams, many of them to the second and third generation. It is supposed that, in the year 1802, there were in France 15,000 sheep of the pure Merino breed; and nearly 1,000,000, the wool of which was meliorated by having been crossed with that race. The eagerness to procure them was extremely great. This appears from the account already given of the great increase in their prices. They had been demanded and obtained by 21 departments; and, at the public sale at Rambouillet, in 1802, no less than 57 farmers were purchasers.

From the account which I have thus given, it appears that the Spanish breed of sheep has been much improved in weight, and, probably, fineness of fleece, and has considerably increased in size, by having been naturalized in France. These valuable points have been accomplished chiefly in the four following ways:—

1st. By choosing for breeding the best and finest woolled rams and ewes.

2d. By never allowing them to propagate till they have attained their full growth; which, at the earliest, is not till nearly three years of age.

3d. By separating the weak from the strong; and,

4th. By giving them plenty of good food, and free air and exercise.

With regard to food, it is certain that the Rambouillet flock is most abundantly supplied. In the summer, they are fed in the field with natural grass, or soiled with clover or lucerne. In the winter they have meadow hay, or lattermath; clover, lucerne, or vetch hay, or lattermath; straw, chaff of corn, and oats. The straw is put in their racks, and serves, at the same time, for litter. Some of the sheep have each half a pound of oats daily. They are folded on healthy ploughed land, in dry weather, from the middle of July to the end of October; and are housed during the whole winter in airy buildings; except that they are made to walk out for two hours every day. Some oats are given to the rams during the season of copulation; and the French think that a great deal of the size and woolliness of the offspring depends on the vigour of the ram, rather than of the ewe.

The sheep are divided into three separate flocks, lambs, ewes, and rams. The young lambs remain with their dams during the day, are separated from them at night, and weaned at the age of five or six months.

A month before lambing, a little bran, or some oats, peas, horse-beans, or other corn, is given to the ewes; and the same food is continued for a month or more afterwards, especially when a sufficient quantity of good herbage is not to be obtained in the fields. A little bran is also given to the lambs, as soon as they are able to eat it. This supply of bran and corn is said to be unnecessary when there is sufficient pasturage.

It is recommended to allow salt, either alone, or mixed with bran or oats, in the proportion of half an ounce per diem to each sheep. Clear, and, if possible, running water, is given to the sheep every day.

Whether housed or folded, they are never permitted to go out to feed till the dew is dissipated; and to this precaution is chiefly attributed their exemption from the rot. With the same view, in moist weather, their hunger is first appeased with dry food.

According to the French writers, the most unwholesome of all land is that which is overflowed in the winter, and dry in the summer.

Trees, sheds, or houses are ready for sheltering the flocks from the extreme heats of the summer and autumn.

From 30 to 40 ewes are allotted to each ram. I have already mentioned that both sexes should be, at least, two years old; but we are told, that, if persons are eager to augment their flocks, the 2 tooths may be allowed to take the ram without injury, provided the lambs are made to suck other dams, or she goats; it having been found that it is nursing, rather than gestation, which impedes their growth, and lessens their fleece.

Attention being paid to these cautions, the rams may be used for breeding till the age of seven or eight years, and the ewes till that of 11 or 12.

For the sake of the ewes as well as of the lambs, the weaning is always performed gradually.

The tails of the sheep, and the horns of the rams, are always shortened.

I have mentioned above that the wool of the 4th cross of the Merino ram with common ewes is usually equal to that of the pure race. It is asserted by Gilbert, and agreed to by other breeders, that, at this period, a ram of the mixed breed,

which appears to have all the requisite qualities of the fleece, may, in that view, be used for generation equally with the best pure Merino. Of the truth of this position I shall, hereafter, adduce many satisfactory proofs.

M. Pictet prefers putting his ewes to the ram during their first heats; which happen, with him, about the beginning of July. In this manner the lambs fall in December; and the ewes are fed in the house from a month before yeaning till spring, with lattermath hay of lucerne and clover, and a handful or two of oats each every day. This food is said to give them abundance of milk.

In order to increase the growth of his lambs, which he considers as a point the most essential to the size and form of the adult animal, M. Pictet gives each of them, night and morning, from the age of three months till the time of weaning, a handful of bran, and half a handful of oats; and, afterwards, double that quantity, till they are eight months old. At five months he weans them, gradually, by first separating them from the ewes at night only. If, at the time of weaning, there is not abundance of healthy grass, he supplies this defect by hay or lucerne.

He folds his sheep at night upon his arable land, during five or six months of the fine season, where they feed, during the day, on the fallows, the stubbles, or natural and artificial grasses. He gives them also the leaves and tender branches of the underwood of ash, poplar, and oak, which is cut in the autumn for fire-wood, and, after being stripped by the sheep, is made up into faggots.

A very long and minute set of directions, for shepherds, has been compiled from the works of Daubenton, and published in France, with illustrative plates by Gilbert, under the title of "Instruction pour les Bergers." This book, though containing much useful information to beginners, which might well serve as an example worthy of imitation by some competent writer in this country, abounds with puerilities, which have not escaped the lash of the French critics themselves.

According to Count Alexis Orloff, some Merino sheep have been introduced into Russia; but we are not informed of the result *.

With regard to this breed at the Cape of Good Hope, I am favoured with the following particulars by Sir George Yonge, late governor of that colony, while in the possession of the English. According to that gentleman, the native sheep have broad tails, which, on examination, prove to be double, united together by a thin membrane, and covered with one skin, so as to appear single. Having myself

* Communications to the Board of Agriculture, vol. i. p. 346.

once had a ram of this breed, I can state that the wool chiefly consists of very long and coarse filaments like hair. Of these sheep it is supposed that there were in that district, in 1800, about one million.

Besides these, there have been imported into the colony, at various times, in the first instance about half a century ago, and, as it is said, by the family of Van Reenen, Spanish sheep; which, in 1800, were estimated at nearly 6000, and which were constantly increasing, the food and climate appearing to suit them perfectly well. Samples of the wool were at that time sent to England by Sir George Yonge, and found to be of good quality. Of this Merino wool from the Cape, I possess a specimen, certainly not the best. Sir George has lately given me a sample of the wool of the flock of M. Van Reenen, at the Gantz Kraal, sent over in October, 1805, and which is from the fourth cross of the native hair-bearing ewes with pure Merino rams. This specimen is a convincing example of what may be effected merely by judicious crossing. The staple is shortened, and the filament is become so fine, that another cross must, beyond all doubt, make it fully equal to good Spanish wool.

From these Cape Merinos sprung those sheep which, in 1797, were carried to the English settlement on the coast of New Holland, by Captain M'Arthur. Of this gentleman I cannot better report the progress and future projects, than by copying his Memorial to the English government in the year 1803.

Statement of the Improvement and Progress of the Breed of fine-woolled Sheep in New South Wales; delivered at the Right Honourable Lord Hobart's *Office, July* 26, 1803.

"The samples of wool brought from New South Wales having excited the particular attention of the merchants and principal English manufacturers, Captain M'Arthur considers it his duty respectfully to represent to his Majesty's ministers, that he has found, from an experience of many years, the climate of New South Wales is peculiarly adapted to the increase of fine-woolled sheep; and that from the unlimited extent of luxuriant pastures with which that country abounds, millions of those valuable animals may be raised in a few years, with but little other expense than the hire of a few shepherds.

The specimens of wool that Captain M'Arthur has with him have been inspected

by the best judges of wool in this kingdom; and they are of opinion, that it possesses a softness superior to many of the wools of Spain; and that it certainly is equal, in every valuable property, to the very best that is to be obtained from thence.

The sheep producing this fine wool are of the Spanish kind, sent originally from Holland to the Cape of Good Hope, and taken from thence to Port Jackson.

Captain M'Arthur being persuaded that the propagation of those animals would be of the utmost consequence to this country, procured, in 1797, three rams and five ewes: and he has since had the satisfaction to see them rapidly increase, their fleeces augment in weight, and the wool very visibly improve in quality. When Captain M'Arthur left Port Jackson, in 1801, the heaviest fleece that had then been shorn weighed only $3\frac{1}{2}$lbs.; but he has received reports of 1802, from which he learns, that the fleeces of his sheep were increased to 5 lbs. each; and that the wool is finer and softer than the wool of the preceding year. The fleece of one of the sheep, originally imported from the Cape of Good Hope, has been valued here at 4*s.* 6*d.* per lb. and a fleece of the same kind, bred in New South Wales, is estimated at 6s. per lb.

Being once in possession of this valuable breed, and having ascertained that they are improved in that climate, he became anxious to extend them as much as possible. He, therefore, crossed all the mixed bred ewes, of which his flocks were composed, with Spanish rams. The lambs produced from this cross were much improved; but when *they* were again crossed, the change far exceeded his most sanguine expectations. In four crosses, he is of opinion, no distinction will be perceptible between the pure and the mixed breed. As a proof of the extraordinary and rapid improvement of his flocks, Captain M'Arthur has exhibited the fleece of a coarse-woolled ewe, that has been valued at 9*d.* a pound; and the fleeee of her lamb, begotten by a Spanish ram, which is allowed to be worth 3*s.* a pound.

Captain M'Arthur has now about 4000 sheep, among which there are no rams but of the Spanish breed. He calculates that they will, with proper care, double themselves every $2\frac{1}{2}$ years; and that, in 20 years, they will be so increased, as to produce as much fine wool as is now imported from Spain, and other countries, at an annual expense of £1,800,000. sterling. To make the principle perfectly plain, on which Captain M'Arthur founds this expectation, he begs to state, that half his

flock has been raised from 30 ewes, purchased in 1793, out of a ship from India, and from about 8 or 10 Spanish and Irish sheep, purchased since. The other half of his flock were obtained in 1801, by purchases from an officer who had raised them in the same time, and from about the same number of ewes that Captain M'Arthur commenced with. This statement proves that the sheep have hitherto multiplied more rapidly than it is calculated they will do in future; but this is attributed to the first ewes being of a more prolific kind than the Spanish sheep are found to be: for since Captain M'Arthur has directed his attention to that breed, he has observed the ewes do not so often produce double lambs.

As a further confirmation of the principle of increase that Captain M'Arthur has endeavoured to establish, and which he is positive time will prove to be correct, he would refer to the general returns transmitted from new South Wales. In 1796, (since when not 100 sheep have been imported) 1531 were returned, as the public and private stock of the colony. In 1801, 6757 were returned; and although, between those periods, all the males have been killed as soon as they became fit, yet there is a surplus, over the calculation, of 633.

Captain M'Arthur is so convinced of the practicability of supplying this country with any quantity of fine wool it may require, that he is earnestly solicitous to prosecute this, as it appears to him, important object; and, on his return to New South Wales, to devote his whole attention to accelerate its complete attainment. All the risk attendant on the undertaking he will cheerfully bear. He will require no pecuniary aid; and all the encouragement he humbly solicits for is the protection of Government, permission to occupy a sufficient track of unoccupied lands to feed his flocks, and the indulgence of selecting from amongst the convicts such men for shepherds, as may, from their previous occupations, know something of the business.

JOHN M'ARTHUR."

Some samples of this wool were given by Captain M'Arthur to that truly patriotic manufacturer and magistrate, Thomas Joyce, Esq. of Freshford, near Bath, from whom I have received a specimen equal in fineness to almost any which I have ever seen.

I believe that Captain M'Arthur, who had succeeded in obtaining the most essential part of the prayer of his petition, was permitted to take with him to New

Holland several Merino rams and ewes, which, zealous for the improvement and extension of his flock, he had purchased at the auction of his Majesty's sheep, at Kew, in 1804.

When this gentleman speaks of doubling his flock every three years, he is certainly right as to numbers. But it is easy to shew that, beginning with 2000 coarse ewes, and excluding the double lambs, which will probably occur only from the first cross, he will be eight years before he can possibly have more than 125 shearling ewes of the 4th cross.

Merino sheep have been, at various times, imported into Great Britain. Daubenton, Lasteyrie, and other French writers, consider our finest-woolled breeds as either wholly descended from the pure Merino race, or as greatly improved in fleece by an early admixture with it. This opinion seems to have been derived from the Folio French Encyclopedie, which, under the article " Laine," gives us the following history. " Henry the VIIIth procured from Charles the Vth of " Spain, 3000 sheep, which were placed under the direction of a committee, con- " sisting of persons of sense and probity. They began with allotting a ram and " two ewes to each parish, the climate and pasturage of which were proper ; with " a strict injunction not to kill or mutilate any of these animals for seven years. " Each lot was given to a gentleman, or substantial farmer, who was rewarded for " his care with an exemption from certain taxes, or with some honourable or " lucrative privilege. We are told that, in consequence of these measures, the " breed succeeded perfectly well, and, in a short time, greatly increased. The " advantages of this race were farther diffused by uniting Spanish rams with native " ewes; and thus three precious breeds of sheep were established in England."— The same relation is repeated and enlarged in the 4to. Encyclopedie, which adds, that the regulations of Henry were confirmed by Elizabeth, who also imported rams from Barbary, and all other countries where they could be procured, with any chance of improving our native breeds. *

This is a very simple and plausible tale, which wants nothing to recommend it but truth. One may infer, from the writer in the Folio Encyclopedie, that he derived his information on this subject from Daniel de Foe, a lively and interesting author, to whose historical fidelity, in this instance, much less credit is due than to

* The article " Manufactures," in the 4to. Encyclopedie, was written by Roland de la Platiere ; a name often heard amid the storms of the French revolution.

his relation of the plague in 1665, or to his admirable romance of Robinson Crusoe. I have not been able to discover in any contemporary writer, or public record, a syllable of any importation, distribution, or regulation of Spanish sheep in the reigns of Henry VIII. Elizabeth, or any other of our monarchs.*

A few Spanish sheep have been, in modern times, imported into this island. It would be difficult to ascertain the dates of these small importations; but it is certainly much to be regretted that the Society in the Highlands of Scotland, which had paid great attention to this object, and had obtained a great number, and many varieties, of sheep, with every prospect of important success, should so soon have abandoned its pursuit, and that its flocks should have been so unprofitably dispersed.

About the same period, our gracious Sovereign seems to have obtained some Merino sheep; but it was not till the year 1792, that he made the important acquisition of 5 rams and 35 ewes, from the flock of the Countess del Campo Alange, which is called Negrette. Of these sheep, his Majesty, during several successive years, was pleased to distribute various rams and ewes to many noblemen and gentlemen, who occupied their own lands, but who do not seem to have continued the cultivation of that breed, or to have published any reports of the result of their experiments. This was not, however, the case with regard to various rams graciously presented to the Agricultural Society of Bath, through the medium of the Earl of Ailesbury and Sir Joseph Banks. These rams were carefully preserved, eagerly sought for, and, as long as they lived, employed in various ways to the full extent of their powers. This mode of distribution having, however, thus generally failed, it was judged better to give greater scope for the exertions of more active experimenters, by allowing an open sale, at a small fixed price, of some rams and ewes of the Royal Merino flock. At length, it was finally resolved to promote the same view of a general extension of the breed by a public auction, which has, accordingly, been held for the two years last past at Kew. At the auction of 1804, 30 rams sold for £572. 10*s.* 6*d.* and 14 ewes for £122. 17*s.* The average of the rams was, therefore, £19. 1*s.* 8*d.* and that of the ewes, £8. 15*s.* 6*d.* The highest price of a ram was 42 guineas, and the lowest, £6. 15*s.* The highest price of an

* Such is the fidelity of the moral and philosophical Diderot, D'Alembert, and the other celebrated associates of Frederic the Second and Voltaire! The folio Encyclopedie is, beyond all comparison, the most voluminous collection of fables extant.

ewe was 11 guineas, and the lowest 6 guineas. In the year 1805, the sheep being younger, and in every respect better, 17 rams were sold for £578. 0*s*. 6*d*. and 21 ewes for £507. 14*s*. The average price of the rams was, therefore, £54. and that of the ewes, £24. 3*s*. 6*d*. The highest price of a ram was 64 guineas, and the lowest 21½ guineas. The highest price of an ewe was 35 guineas, and the lowest 10½ guineas. From the greatness of these prices, and more especially their rise at the last auction, some judgment may be formed of the high and increasing estimation in which the Merino breed of sheep begins to be held in this country.

Of the progress of the Royal Merino flock, both as to wool and carcase, ample information may be obtained from the accurate reports, up to August 1803, by Sir Joseph Banks, under whose care this flock is placed, and through whose judicious management, the form has been considerably improved, and the fleece rendered finer than the N. E. or Negrette pile, which is the wool of the parent flock now existing in Spain.

The public is well acquainted with the judgment and zealous activity in all agricultural pursuits which have long characterized Lord Somerville. That nobleman has imported from Spain a large number of Merino rams and ewes, which he has treated so successfully that, while the cloth from his wool is far superior to the greater part of that which has been manufactured from any Spanish, the form of the carcases is so ameliorated as to be fast approaching to that of the best Ryelands or South Downs. Lord Somerville has sold part of his flock, and, as appears from the Report of his Farm, in the Tenth Volume of the Bath Society's Papers, let rams in the year 1803, to the amount of £524. 10*s*.

From these two Merino flocks have been formed that of Lord Porchester; of which I am unable to speak from my own knowledge; and that of Mr. Tollet, who has published an account of it in the Annals of Agriculture. His pure Merinos, in 1804, consisted of 16 rams, 32 ewes, and 8 shearling ewes; in all 56. The rams yielded of wool, in the yolk, 130 lb. or 8 lb. 2 oz. each; the ewes, 191¾ lb. or 5 lb. 15 oz. each; and the shearlings, 34¾ lb. or 4 lb. 5½ oz. each; exclusively of the lamb's fleece. The total weight was 356½ lb. and the average 6 lb. 6 oz. each fleece. The 356½ lb. were reduced, by washing to the Spanish state, to 184 lb.; and if, when purified by clean scouring, this wool, like the best Spanish, suffered a farther waste of 3½ lb. per score, the total reduction would be to 152 lb. or to somewhat less than ⅘ of the original weight. It sold for 20*s*. per

fleece, or 3*s.* 1½*d.* per lb. through all the sorts in the yolk; the value being taken from Spanish Refina at only 6*s.* 4*d.* per lb.

Besides these larger flocks, there are, in this kingdom, many smaller ones of pure Merinos, which I cannot particularize.

It appears to me, however, that the principal mode in which the utility of the Merino race has been extended in England, has been by crossing our native breeds with Merino rams.

In this important design great progress has been made by many farmers and manufacturers of cloth; among the latter of whom I am acquainted with two, who purpose increasing their flocks to several thousands each.

I believe that the cross of the Merino ram with Ryeland ewes is that most cultivated in England. Mr. Birkbeck, of Wanborough, in Surrey, is zealously employed in crossing five or six hundred ewes of the South Down race, chiefly with Merino-Ryeland rams of my flock. Mr. Bartley, late Secretary of the Bath Agricultural Society, and the Rev. Mr. Richardson and Mr. Heaven, both in the neighbourhood of Bath, have also cultivated with great success a cross between the Merino and the Wilts breeds, which was first established by Mr. Whitaker of that city, and is conspicuous for the weight and fineness of its fleeces.

The noblemen and gentlemen of Ireland have of late attempted to introduce into that country the breed of fine-woolled sheep. With this view, in 1804, they offered the following premiums for sheep, to be exhibited at the great cattle fair at Ballinasloe.

	£.
1. For the best ram's fleece grown in Ireland, — — —	20
2. For the best Merino ram, two or more years old, — —	20
3. For the best ditto, one year old, — —	20
4. For the best five Merino ewes, — — — —	20
5. For the best Merino ram's fleece, grown in Ireland, — —	10
6. For imported Merino ewes, as far as 100 in number; each ewe, —	1

For the last five premiums there was that year no claimant. The first was obtained by the Earl of Farnham, for a Merino Ryeland fleece.

PART II.

HISTORY OF THE MERINO-RYELAND BREED OF THE AUTHOR.

CHAPTER I.

First Establishment of the Breed. Number of the Flock. Reasons for expecting the Possibility of producing Fine Wool in England. This Expectation confirmed by Experience in a great variety of Latitudes, and under every Kind of Regimen. Effect of crossing fine and coarse-woolled Ewes, in point of Fleece. Fineness of filament, inelasticity, and softness greater in the Merino-Ryeland than in the pure Merino. Specimens exhibited of Wool, Cloth, and Casimir. Proportions of different sorts of Wool in the Fleece. Age at which the Wool is finest. Weight of the Fleeces. Proportion of the Yolk and other Impurities. Value of the Wool scoured, and in the yolk. Proves more in the Manufacture than the pure Merino; and why. Price of the Wool, and of the Cloth made from it. Quality of the Wool of earlier Crosses. Effects of Heat and Food on the Wool. Does not fall off at a particular Season. Colour. Lamb's Wool; fineness, weight, and value. Cloth exhibited.

In the year 1788, I began to build a country-house, to which was attached a small portion of land. This land was high, of a thin staple, dry, unsheltered, and, consequently, unproductive; notwithstanding which, from its situation, it had borne an exorbitant price. Such as it was, however, I was obliged to stock it; and I accordingly put on it some cows, and sheep of the same breed as those with which it had been before depastured, and which were of the Wiltshire race. It was not long, however, before I discovered, that a cow was, in every possible form, ruinous to those whose avocations would not permit them constantly to superintend the application of its produce; and that the sheep would not reimburse the rent of the soil. By degrees, I parted with my cows and Wiltshire sheep, and substituted some of the small breed of Portland. These succeeded well, and readily fattened

on land, which was rich, comparatively with their native desert. The mutton which they afforded was of a delicious flavour. So far was well. On the other hand, their wool was inconceivably coarse, and, in point of weight, almost nothing.

About this period, 1792, the late Earl Bathurst informed me of the design which the King had then, as I understood, recently entertained, of introducing into England the Spanish breed of sheep. Of these he had given Lord Bathurst a ram, which was, at that time, in his Lordship's park, at Cirencester.

In reflecting on this subject, my mind soon became impressed with the belief, that, circumstanced as I was, the most profitable application of such land as mine would be to a breed of sheep, the return of which would chiefly depend on the fleece. My care would thus be at once abridged. I should no longer depend for my profit on the butcher. The wool would be easily weighed; its value as easily ascertained, and readily given by some of the numerous clothiers who lived at a short distance from me.

In order to accomplish this end, no better mode occurred to me than to pursue the project of his Majesty, by crossing our native English ewes with Merino rams. I had considered with some attention, but soon rejected as unconformable to the fixed analogy of nature, the prejudices which had limited the production of wool of the Spanish quality to that small space of earth, on which, in our times, it happened to be found: nor had I any doubt that, with due care, and in a sufficient length of time, the properties of the parent fleece might be transmitted to the hybrid progeny. This end it was natural for me to seek by what seemed to be the readiest means. Accordingly I fixed, as the basis of my experiments, on that breed, which has long been reputed for affording some of the finest wool in this Island. This was the Ryeland; a breed otherwise adapted to my purpose by its hardiness, and its habits of easily subsisting on a poor soil. Of these sheep I procured a sufficient number, of the pure uncrossed race. My chief difficulty lay on the side of the male. For an obscure individual like me to obtain from Majesty the intire possession of a Merino ram, was utterly impracticable. I was, therefore, obliged to confine my wishes within narrower limits, and readily had leave from Lord Bathurst to send six of my ewes to his Spaniard. The same liberty he kindly offered me the following year; but, through feelings of delicacy, which were doubtless misplaced, I availed myself of this privilege only for two ewes. From what flock in Spain this ram was derived, I am unable to say. He was, surely, the most hideous of his kind.

This did not, however, in any degree abate my obligation to his noble possessor, whom I may justly consider as the original author of any success which has attended my subsequent endeavours.

In the year 1792, the flock of Negrette sheep arrived from Spain. No sooner did this opportunity offer, than the King, conformably to the long habits of his mind, availed himself of it to promote the welfare of his people. Among the many individuals, or public bodies, to whom he graciously presented rams of this race, were the late Marquis of Bath, the Earl of Ailesbury, and the Bath and West of England Agricultural Society. From one or other of these rams I had seven ewe lambs in the year 1794. That season passed, as far as I recollect, without my having any opportunity of procuring the service of any Merino; but, in 1795, I was able to cross 17 ewes with the rams above-mentioned; and, the following year, the Marquis of Bath permitted me to send some ewes to his Merino ram.

In the year 1797, I first obtained possession of a ram of this breed; and from that period have always been able to employ males of the pure blood, whenever, for improvement or experiment, I have wanted them.

In this mode I have gone on gradually increasing, and, I trust, improving my flock, till last autumn it consisted of the following fine-woolled sheep and lambs:—

Ewes of all ages,	184
Rams,	46
Cut rams,	22
Wethers,	27
Lambs,	103
	382

Besides which, I had, either by accident or design, of coarser sheep,

Ewes,	88
Wethers,	7
	95

making a total of 477 sheep and lambs.

I have mentioned that it was the wool of the Merino race, which first excited my attention. General opinion had long decided, that it was impracticable to raise in this country wool equal to that of Spain. To me, however, it appeared that

this opinion, whether as referable to climate, food, or habits of travelling, was founded on nothing better than mere prejudice. My conclusion was derived both from analogy and direct experience. While the skin and hair of the Negro and Gypsey in England remain unchanged, the latter through centuries, from what they originally were in Africa, Hindostan, or Malacca, those of the North American and West Indian, of European descent, continue similar to those of their native country. The form and feathers of the Turkey and domestic fowl are just such as they formerly were, and now are, in North America and Asia. The Arabian stallion delivers down his most vaunted excellences to his progeny, through our native mares. These circumstances take place in spite of all the changes of climate, food, and general habits of life.

On the other hand, the Finlander and Laplander, contiguous inhabitants of the northern parts of Sweden, continue, to this day, two distinct varieties of the human race.

With regard to sheep themselves, the fineness and weight of fleece are by no means relative to the climate, soil, quantity or quality of food, size, or habits of life. The breed of Portland, though one of the smallest in Great Britain, and living on bare, natural pasture, in a temperate climate, yields, as I have before observed, a small fleece of the coarsest clothing wool. So also the sheep on the cold mountains of Wales. On the other hand, the Merino breed, inhabiting in Spain a climate much warmer than those just mentioned, has the finest fleece in the world, and, probably, the heaviest of short wool in proportion to the weight of the animal producing it. I have already shewn that in the time of the ancient Romans, the sheep of the southern part of Italy, which were greatly valued, cultivated with the utmost care, and continually kept in small inclosures, or even in stables, afforded the very finest wool; while another breed of sheep in the same neighbourhood, which then took, and at this day take, regular annual journies of two or three hundred miles to the Appenines, yielded, and continue to yield, fleeces of a much coarser filament. The reader, who would wish to see many additional arguments to this effect, may consult my treatise, already mentioned, and the various works of Dr. Anderson. From them he will find great reason to conclude, that the powers attributed to these various causes, as of the heat of the West Indies to change sheep's wool into hair, are visionary; and that, in any country, if care be taken to prevent a particular variety of animals from mingling with its neighbouring variety, the peculiarities of

form, size, and covering may be generally delivered down to posterity through the longest known periods of time.

To these arguments, deduced from analogy, we are now able to add the unequivocal and decisive test of direct experience. We have seen above, that neither a particular climate, temperature of air, nature of wholesome food, nor much exercise, are essential to the production of fine wool. We have seen that the Merino breed itself has been naturalized in Sweden, Denmark, Prussia, Saxony, Silesia, Hungary, Austria, Hanover, Holland, England, Bayreuth, Anspach, Wirtemburgh, Baden, France, Switzerland, Piedmont, the Cape of Good Hope, and New Holland. This immense tract affords a range of latitude of from 59° 20′ north, to 34° south: and includes countries, some of which are elevated, others low; some dry, others swampy; some open, others inclosed or woody; some rich, others poor some hot, others temperate; others intensely cold. In one country this breed is exposed during the whole year to the external air, and all the vicissitudes of weather, and exercises itself at will. In another, it is constantly housed during the night, and sheltered from every storm; or for six or seven months of winter never uses its limbs, or inhales the open air, but during a part of the middle of every fine day. Even in Spain itself, many of the finest of the Merino breed never travel.

The food of this race is as various as its climate and exercise. Here it lives the whole year chiefly on natural and fresh grass. There it obtains in winter the addition of hay. In Spain, it feeds not only on the fine herbage of the mountains, but on the succulent grass of the richest meadows, and occasionally on the leaves of vines and other trees, and all the variety of plants in the fallow or stubble fields. In other countries it is variously fed on clover, lucerne, sainfoin, burnet, vetches, succory, reeds, the leaves of different trees, and the haulm of plants; all sometimes fresh, and at other times dried; straw; the fruit and husk of the horse chesnut; bran, potatoes, carrots, beet, peas, beans, grain of all kinds, and every sort of turnips and cabbages. To these kinds of food, some proprietors of flocks habitually add salt, and other medicaments; others use them only occasionally, and some entirely omit them.

Under this diversity of climate, soil, and treatment, than which the mind can scarcely picture a greater, the Merino race of sheep has been found by experience to thrive and produce wool, which is, in every respect, fully equal to the very best

of the native growth of Spain. These facts surely prove that it is peculiarity of breed which we are to consider as chiefly productive of fine wool, in spite of the operation of other causes; and that the Merino breed is capable of bearing its transcendent fleece in this or any other country, in which it can subsist in sound and robust health.

I have also stated above, that, according to the general opinion of cultivators on the Continent, any breed of ewes, however coarse and long in the fleece, will, on the fourth cross of the Merino ram, give progeny with short wool equal to the Spanish.

Of the truth of this proposition I have, however, some doubts, derived from experience. The wool of the fourth cross of the Wiltshire breed is evidently much longer, and appears to me to be less fine and soft than the Spanish; and the same is true with regard to the specimen of Cape wool, of the same cross, sent me by Sir George Yonge. It is certain, however, that one cross more would, in both these cases, effect the desired purpose.

If we suppose the result of the admixture of the blood of the Merino ram to be always in an exact arithmetical proportion, and state the native blood in the ewe as 64, then the first cross would give $\frac{32}{64}$ of the Merino; the second $\frac{48}{64}$; the third $\frac{56}{64}$; the fourth $\frac{60}{64}$; the fifth $\frac{62}{64}$; the sixth $\frac{63}{64}$; and so on. In other words, the first cross would leave 32 parts in 64, or half, of the English quality; the second 16 parts, or one-fourth; the third 8 parts, or one-eighth; the fourth 4 parts, or one-sixteenth; the fifth 2 parts, or one thirty-second; the sixth 1 part, or one sixty-fourth; and so on.

Now if the filament of the Wiltshire, or any other coarse wool, be in diameter double that of the Ryeland, it is obvious that, according to the above statement, it would require exactly one cross more to bring the hybrid wool of the former to the same fineness as that of the latter. This, I believe, very exactly corresponds with the fact. The difference between one-eighth and one-sixteenth is very considerable, and must certainly be easily perceived both by a good microscope, and in the cloth which is manufactured from such wool. In the latter method it certainly has been perceived; but I have hitherto had no opportunity of trying the difference by the former. The fifth cross, as I have before observed, brings the Merino-Wilts wool to the same standard as the fourth of the Merino-Ryeland.

This advantage is very considerable in favour of the Ryeland, and other fine-

woolled breeds of ewes, in point of time. For if we begin with 1000 ewes, and suppose the male and female produce to be annually equal, and the shearling ewes to be continually crossed with the Merino ram, it will be 8 years before we can obtain 125 shearling sheep of the fourth cross.

This proposition, and the comparative inference from it, will best be demonstrated by the following table, which supposes the experiment to commence in the year 1800, with 1000 Ryeland ewes, and in which the number of crosses is marked by the small figure on the right of each number.

EWE PRODUCE.

1800	1000 ewes		
1801		1000 ewes	
1802	500^{1}		1000 ewes
1803		500^{1}	
1804	250^{2}		500^{1}
1805		500^{2}	
1806	125^{3}		750^{2}
1807		375^{3}	
1808	$62\frac{1}{2}^{4}$		750^{3}
1809		250^{4}	
1810	$31\frac{1}{4}^{5}$		625^{4}

From this table it appears, that in 8 years there would be only $62\frac{1}{2}$ females, and, consequently, 125 of both sexes, of the fourth cross, and none of the fifth; and that, in 10 years, there would be from the coarser breed of ewes only $31\frac{1}{4}$ shearling ewes, and $62\frac{1}{2}$ of both sexes of the fifth cross, or requisite fineness; whereas from the Ryeland ewes there would, at the same period, be of the same fineness $937\frac{1}{2}$ shearling ewes of the fourth cross, and of the fifth cross $31\frac{1}{4}$ ewes, or, in round numbers, 969. To which add as many males, and the whole number will be 1938.

This calculation implies that the females take the ram at a year and a half old, and not sooner. Were any other rule observed, the difference would be proportionable in both cases.

Perhaps some advantage on the side of the larger breeds would arise from their being somewhat more apt to produce two lambs at a birth. But this difference is confined only to a few sorts; and would cease as the Merino influence increased. It would, however, be worth while to make the experiment with the Dorset and Mendip breeds, which are the most remarkable of all those in England for this fecundity. The result would, certainly, go a short way in compensating the disproportion above stated of 1938 to 62½ in favour of the Ryeland breed.

In making this comparison, I have assumed the influence of the ram's fleece on that of the ewe as being always one-half. Some persons are of opinion that it is greater. If this be true, the proportional benefit would, in both cases, be exactly alike.

This leads me to observe, that we have no right even a priori to conclude the Merino fleece to be, in any view, the best which can exist on a sheep. Who shall decide, that in point of smallness, strength, and inelasticity of filament, a proper mixture of breeds, in a climate and with food adapted to the health of the sheep, may not produce wool superior to the Spanish? I think I shall shew that this is probably the case in the union of the Merino with the Ryeland.

The importance of the first quality, or fineness of filament, is very generally acknowledged. The second can be consistent with the first only to a certain extent. The first may go to an unprofitable length, in consequence of the waste to which it must then subject the wool in the manufacture, especially under the harsh and undistinguishing action of machinery, which subdues and tames, if I may so express it, the stiffer and more elastic wools.

With regard to the third quality, nothing can more clearly shew the defective application of reasoning to mechanics on this subject, than the continual boast of the wonderful elasticity of Spanish wool. The very term itself is not understood. What is elasticity? Observe a common bow, which cannot without force have its straitness changed into an arc, and, when that is removed, with great violence and velocity resumes its original form. This effect is owing to what is called elasticity. In hair there exists a great degree of a similar tendency, of which fabulists have made a wanton and ridiculous use. It is this very quality of over-elasticity, which

makes hair incapable of being properly spun, and afterwards felted by milling; operations, which absolutely require that the filaments should readily submit to be approximated and intertwisted, and, far from regaining their pristine straightness, remain in that state into which they have been forced by art. It is, therefore, this quality of inelasticity, to a certain degree, which gives Spanish wool its superior capacity of grounding or milling. To the same cause we may attribute its greater softness, smoothness, and silkiness to the touch, both before and after manufacture: for these qualities are nothing more than the ready yielding of the body and all the projecting points of the filaments to the very sensible nervous papillæ at the ends of the fingers, as they press or pass over them in every direction. These properties afford the great distinction between the Merino and best English wools. It is by no means wholly connected with mere smallness of filament; for there are parts of the Ryeland and Morfe fleeces, which are fully equal in that respect to good N. E. or Negrette wool; notwithstanding which, cloth made from them is comparatively hollow, and to the touch dhar, rough, and wiry.

On the other hand, the superior softness and silkiness of the wool of the fourth cross of my Merino-Ryeland breed to that of the pure Negrette from which it was derived, will not admit of any doubt. Still farther improvement in this quality may be obtained from continually breeding in and in, as it is called, from sheep at that degree of mixture. These facts I have fully detailed in the Tenth Volume of the Papers of the Bath Agricultural Society, in which it is stated that I found the wool of a whole generation made considerably coarser by a fifth cross of the pure Merino. It might, indeed, be questioned whether this difference might not have arisen from the inferior quality of the fleece of that individual ram which I then employed. It is, however, there said, that the sheep, of which I spoke, sprung from three different Merinos, and that there was the same general inferiority of fineness in the wool-produce of all. On the other hand, it cannot be doubted that my great choice of rams of the Merino-Ryeland mixture gave me an advantage, which was merely arithmetical, of selecting, from my own stock, rams with finer fleeces than those of the pure Merino breed to which I had access; and that rams so chosen would transmit this superiority to their descendants. We do, in fact, find that some such care in selection has so improved the wool of the Merino race, as to have made it, in other countries, superior to what it is in that from which the breed has been derived. This is certainly the case with the wool of the flock of

Lord Somerville; and that of his Majesty is finer than the original pile of the Negrette flock in Spain. The same is true with regard to some of the sheep in France, and especially of those of M. Charles Pictet. I should also here adduce the example of the Saxon wool, which, as I have before observed, the concurrent testimony of manufacturers now places in a superior rank to the primitive Spanish, were I not strongly inclined to suspect that a considerable part of it is wool of the mixed breeds.

When, however, I compare the wool of my Merino-Ryeland sheep of the fourth cross with the best wool of the Negrette pile from Spain, and observe its general superiority to that pile, without any such care as seems to have been bestowed by the superintendants of the Rambouillet flock, and by Pictet, I cannot help conceiving this effect to be owing to the mixture of the two breeds.

In order to demonstrate to the Board the farther improvement which has arisen from a careful admixture of animals of the fourth cross, I beg leave to call their attention to the following articles. No. 1 is the Refina wool of the original Merino ram of the late Marquis of Bath. No. 2 is part of that of his Merino-Ryeland grandson, through a ram and ewe of the same, or fourth cross. The rest of the Refina was purloined by the shearers, each of whom was ambitious of having a part of so fine a fleece. No one can, for a moment, doubt of the superiority of this wool to that of its pure progenitor. This fact is so clear, that it does not even require the evidence of sight. By putting the hand into the respective bags in the dark, we shall find the latter, comparatively with the former, rough, harsh, and unyielding. No. 3 is a piece of wool-dyed blue broad-cloth, manufactured by Mr. Naish, of Twiverton, near Bath. Though it has never undergone the hot-press, I request the Board to observe its smoothness and silkiness, its changeable lustre, together with its thinness and flexibility, yet solidity of texture. I appeal to every member, or to any manufacturer or draper whom they may choose to consult, whether any piece of woollen cloth, superior to this, has been, to their knowledge, exhibited in this or any other country. And yet, according to the report of the manufacturer, no more care has been taken in its fabric than ought, on all other occasions, to be employed by every person jealous of his own credit. I am sorry that I cannot speak so highly of the good qualities of the white casimir, No. 4, manufactured by the same gentleman. The chief reason of its comparative inferiority is that the wool of the legs, head, and tail, consisting of less than one-

eighth of the fleeces in the yolk, having been taken from them at the time of shearing, Mr. Naish thought the wool would serve without farther sorting. The whole was, therefore, scoured together, and from the produce, weighing 19½ lb. only 1lb. 2 oz. were afterwards taken out. At least six-sevenths of the fleeces having been thus employed, the casimir was rendered much coarser than if a proper separation had been made of the inferior parts of the wool. Notwithstanding this unfortunate error, it will readily be acknowledged that this casimir is superior to that usually sold from Spanish wool. I may add, that it was wholly composed of ram's fleeces.

The proportion of the Refina wool to that of the coarser sorts varies in different sheep of this Merino-Ryeland breed, It certainly is, at least, equal to that of the pure race. In a piece of blue cloth manufactured for me, in the year 1804, by Mr. Naish, the proportions of the wool in the yolk were as follows:—

	lb.	oz.
Refina, ———	84	0
Fina, ———	15	8
Tercera, ———	5	8
Cahidas, ———	1	12
Loss, ———	0	2
	106	14

In this case the R. F. and T. being 105 lb. the R. and T., which were 21 lb., made exactly one-fifth of the three put together; which is certainly less than the old proportion, and even of the present, in Spanish wool, deteriorated as it is by a grosser method of sorting, and probably by various admixtures. It must farther be observed, that this proportion is taken from my wool in the yolk; whereas the Spanish is estimated in the state of wool of commerce, in which it has been washed in hot water. When the wool above specified was scoured, the whole weight of the R. F. and T. was 51¾ lb.; of which the R. was 42 lb. and the F. and T. 9¾ lb. Now 9¾ lb. multiplied by 5, would give only 48¾ lb.; which is less by 3 lb. than the actual quantity, and proportionably diminishes the coarser parts of the fleece, reducing them considerably below that of the Merino breed in Spain. In this computation no notice is taken of the K. or Cahidas: neither has it been

included in my calculation of the relative weight of the different parts in the original Spanish piles.

I have remarked, that the proportions of the different sorts of wool vary in different fleeces. This will further appear from some future statements; and for it I will now account.

It may be laid down as a principle, that, the finer the whole fleece, the greater the relative quantity of the finer parts. The Fina, Tercera, and Cahidas will, therefore, within certain limits, be reduced exactly in proportion to the improvement which has been made in the wool by a proper union of breeding animals. This is determined by the instance of the wool of 1804, which was a mixture of the fleeces of the fourth cross, and those of their descendants; but which must still be considered as susceptible of improvement by a nicer selection of fleeces, and care in accurate breeding. I am, indeed, from experience, well convinced that the average of any person's Merino-Ryeland wool might be brought to a higher standard than that of the cloth of 1804, and fully to equal No. 3, which is that of 1805. When, therefore, I add, that, in the former instance, about two or three ounces of each fleece, which had fallen out in the shearing, and which, by scouring, would be reduced to less than half that weight, were not added to the fleece wool, it will be acknowledged that this defalcation would be much more than compensated by the improvement which I have mentioned. In deciding on the just proportion of the different sorts of wool in the fleece, we should, therefore, rather under-rate our conclusions, were we to deduce them, in the yolk, from those of 1804, throughout any well regulated Merino-Ryeland flock of the ultimate fineness.

Notwithstanding the small proportion of the inferior sorts of wool in my breed, I can venture to assert that the Fina, or second wool, is equal or superior to the Refina, or best wool of the common Negrette pile. This may be proved by comparing the specimen No. 5, which is the Fina of a Merino-Ryeland ram, got by a ram of the same cross, with the R. of the pure Merino No. 1, now before the Board. No. 6 is the Tercera wool of the same Merino-Ryeland ram.

Having thus endeavoured to establish the softness and fineness, the inelasticity or felting quality, and the proportions of the different sorts in the wool of this mixed breed, I must here observe, in contradiction to the opinion expressed in my former essay, that the fleece of the two-tooth sheep is not uniformly the best in

point of fineness which the animal is capable of yielding. Sometimes their wool evidently improves after the first year. The ram, part of whose fleece is exhibited as specimen No. 2, strongly illustrates the truth of this position. When he was a shearling, his wool was far from fine, and so loose, curled, and irregular, that I noted him in my book as unfit for service. The following year I found his fleece, in every respect, changed. That which is exhibited, he carried last year, when a six-tooth. I employed him pretty largely in 1804; but he died before he had accomplished any part of his labours, in 1805. Upwards of 20 ram lambs of his produce, now in my possession, bid fair to equal his excellence as to wool, with considerable improvement of carcase: and though, from the irregular and trifling manner in which I was obliged to begin my experiments, my sheep, at present, vary considerably as to fineness of fleece, I have no doubt that, in three or four years, by means of these lambs, my whole flock, of the original mixed breed, will have nearly reached one uniform standard. Notwithstanding this instance, I suspect that more frequently, under other like circumstances, the fleece becomes coarser from $1\frac{1}{2}$ to $2\frac{1}{2}$ years of age, and then, for some years, becomes gradually finer.

With regard to the weight of my fleeces, it appears to me that my sheep, at present, carry much the same quantity of unwashed wool as the native breeds of Spain; proper allowance being at the same time made for difference of form. What I mean by this difference is, that my sheep having a rounder barrel, no throatiness or dewlap, and a wider hind-quarter than the generality of the native Merinos, with about the same, or probably a less, weight of carcase, have certainly a smaller surface relatively to their solid contents or weight. If, therefore, the wool be equally spread over that surface, and the size, length, and specific gravity of the filament be equal, they must have a lighter fleece. This principle of the comparative effect of form I have observed to be very general, not only in my breed, but in the pure Merino itself, and some others of its crosses; so that the uglier the animal, the heavier, cæteris paribus, will be its fleece. I may also mention another self-evident principle; which is, that if the number, length, and specific gravity of the filaments in two fleeces be equal, the absolute weight must be proportioned to the size of the filament; or, in other words, the coarser fleece will be the heaviest. This is exactly conformable to the fact. I have observed the fleeces of the third cross of certain breeds to be heavier than those of the fourth; the coarser ones of the fourth to be heavier than the exquisitely fine ones; and the descendants from

the latter, which are deteriorated by a fifth cross of such Merinos as I have been able to employ, to be heavier than their finer predecessors.

There is also a great difference in the weight of the fleece at different ages of the sheep. It may naturally be expected to increase till the animal has reached his full size; which is not before he has six teeth, or is between three and four years old; and it certainly diminishes as he becomes decrepid through age. I have seen the fleece of the same ram vary in two years from 7 lb. 9 oz. to $5\frac{1}{2}$ lb. This especially takes place after the teeth are so much injured by age, as to prevent the animal from feeding; for it is universally found that the quantity of wool is, within certain limits, dependent on a sufficient quantity of wholsome nourishment. This, however, was not the case with the ram which I have mentioned, and which was in tolerable condition; so that the decline of age itself has certainly some power of rendering the fleece thinner in the sheep tribe, just as it causes the hair to fall off in the human race. It is also observed, that, as old age makes human hair grey, so it produces weakness and fragility in wool.

I have before mentioned that, in the opinion of the Spaniards, nursing ewes give less wool than those of the same age which are barren. Hereafter I shall examine this point more particularly as to my own flock.

Upon the whole, I should conceive that, under all circumstances of proper age, plenty of nourishment, and equal fineness of fleece, my flock taken together would give upwards of 5 lb. of wool in the yolk, without reckoning that which falls out in the shearing. But then I must observe, that this does not include the fleeces of the lambs, which have yielded, unwashed, $1\frac{3}{4}$ lb. each, of very valuable wool.

Nothing, certainly, can be more woolly than these sheep. I have rams whose faces are so loaded, that they can scarcely see; and which are covered with wool, not only on their bellies and hind-legs, but on their fore-legs down to the hoofs.

Having already shewn that the proportion of the finer parts of the fleece is at least equal to that of the native Merino, I shall readily be believed when I speak of the uniformity which there is between the wool of the shoulder and that of the rump. The latter is, in fact, sometimes finer, and generally more closely and thickly set on, than the latter.

I have spoken above of the extreme yolkiness of the Merino wool in Spain. This is also considerable in that of the Merino-Ryeland. In this breed, as in the

former, it is subject to much variation from like causes. I have already observed that the yolk may be to a certain degree separated by washing in cold water, but that it is not capable of being entirely detached even by hot water. By the addition of an alkaline salt it may be wholly removed; after which, the weight of the fleece appears to be very much diminished. This waste naturally includes that of the impurities involved in the yolk, and therefore is different in different parts of the same fleece. It is least about the neck, shoulders, back, and sides, where the wool is finest; and greatest about the belly, tail, and legs, where it is coarsest; without any other reason than that the former parts are less exposed to contract filth than the latter. I cannot better point out the waste in the whole fleece, and its variations n the different parts, than by stating the loss which, in certain instances, they have actually suffered by scouring.

In 1800, 36½ lb. of Refina in the yolk, made by Mr. Waldron, of Trowbridge, into white casimir, were reduced, by scouring and picking, to 19 lb.

In the same year, 94 lb. of Refina in the yolk, manufactured by Mr. Joyce, of Freshford, became, when picked and dyed blue, 48 lb.; which is equal to nearly 47 lb. undyed.

In 1801, by the same gentleman, 76¼ lb. of Refina, in the yolk, were reduced, when picked and dyed blue, to 44½ lb; or about 43¼ undyed.

At the same time, 32¾ lb. of the same wool became, when scoured and picked, 19 lb.

In 1802, 118 lb. of fleeces in the yolk, intended for wool-dyed blue cloth, according to the report of Mr. Waldron of Trowbridge, wasted as follows:

	lb.		lb.
Refina,	84½	scoured and picked blue, 47½ probably	46¼
Fina,	28	do. scoured and picked, - -	14
Tercera and Cahidas	5½	do. - do. - -	3
	118		63¼

In the same year, 35¼ lb. of wool in the yolk, manufactured into casimir by Mr. Hicks of Eastington, suffered, in scouring, the following reduction:

	lb.		lb.
Refina,	30¼	scoured and picked, became - - -	17
Fina,	4½	scoured do. - - - -	2¼
Tercera,	½		
	35¼		19¼

In 1803, by the same gentleman, 114 lb. of wool in the fleece, for blue cloth, became as follows:

	lb.				lb.
Refina,	81	scoured and picked,	- - -		44¼
Fina,	22	do.	do. - - -		11
Tercera,	11	do.	do. - - -		6¾
	114				62

In 1804, as above-mentioned, by Mr. Naish of Twiverton, 106 lb. 14 oz. of fleece-wool were thus reduced:

	lb.	oz.			lb.	oz.
Refina,	84	0	scoured and picked,	- -	42	0
Fina,	15	8	do.	do. - -	7	8
Tercera,	5	8	do.	do. - -	2	4
Cahidas,	1	12	do.	do. - -	0	12
Loss,	0	2	do.	do. - -		
	106	14			52	8

The general result of these different experiments will best appear by placing them in one view, first where they comprehend the whole fleece.

	lb.	oz.			lb.
1802	118	0	scoured and picked, became	- -	63¼
	35	4	do.	do. - - -	19¼
1803	114	0	do.	do - - -	62
1804	106	14	do.	do. - - -	52½
	374	2			197

The half of 374 lb. is 187 lb. whence it appears that this wool wastes throughout the fleece less than one half.

Let us now try the waste of the different parts of the fleece.

			lb.				lb.
1800	Refina in the yolk,		36½	scoured	and picked,	became	19
	Do.	do.	94	do.	do.	-	47
1801	Do.	do.	76¾	do.	do.	-	43¼
	Do.	do.	32¾	do.	do.	-	19
1802	Do.	do.	84½	do.	do.	-	46¼

			lb.				lb.
1802	Refina with yolk		30¼	do.	do.	-	17
1803	Do.	do.	81	do.	do.	-	44¼
1804	Do.	do.	84	do.	do.	-	42
			519¼				277½

The half of 519¾lb. is 259¾lb. Hence it appears that the Refina wool wastes considerably less than half.

Of the Fina and inferior sorts,

		lb.					lb.
1802	In the yolk,	33½	scoured and picked,		became		17
	Do.	5	do.	do.	-	-	2¼
1803	Do.	33	do.	do.	-	-	17¾
1804	Do.	22¾	do.	do.	-	-	10½
		94¼					47½

The Fina, Tercera, and Cahidas, taken together, waste, therefore, about half.

On these calculations I must observe, that the R. wool of 1804 wasted more than it ought to have done, for various causes; one of which was its being accidentally more defiled by the seeds of weeds, bits of hay and straw, and the excrements of the Hippobosca ovina, or sheep-tick. On the other hand, the inferior sorts of the same year were ill-scoured or dried, and therefore exhibit less than the average waste of those parts. It follows that the Refina wastes considerably less, and the inferior parts something more, than half of the weight of the whole fleece in the yolk.

Upon the whole it may be concluded with absolute certainty, that if a Merino-Ryeland flock, of the finest wool, be carefully attended to in feeding, shearing, and other particulars, which I shall hereafter specify, and if the operations of scouring and picking be skilfully and faithfully conducted, and on a sufficiently large scale, the total reduction, in this climate, cannot possibly amount to half the original weight of the gross wool in the yolk.

From these calculations, taken in connection with various facts beforementioned, we may conclude, that, in order to procure 2½lb. of clean wool, there will be acquired of unwashed wool,

	lb.	oz.
In my flock, - - - - -	5	0
In that of Lord Somerville, the wool of which wastes ½, -	5	0
Of the wool of Pictet, which wastes ⅖, - - - -	6	2
Of that of Rambouillet, which wastes full ⅔, - - -	7	8
Of that of the Merino breeds in Spain, wasting full ⅔, -	7	8
Of that of the mixed French breeds, which wastes ⅖, -	6	2

Let us now, from the above data, calculate the value of this wool in the yolk, throughout the whole fleece; assuming as a standard that of 1804; which, however, for the reasons above-mentioned, must give to the grower a result less favourable than the just average.

The proportions of the entire fleeces in this wool, had the K. or Cahidas, which had fallen out, been added, would have been as follows:

	lb.	oz.					lb.	oz.	dr.
Refina,	84	0	scoured,	picked,	and dried,	-	42	0	0
Fina,	15	8	do.	do.	do.	-	7	8	0
Tercera,	5	8	do.	do.	do.	-	2	4	0
Cahidas,	2	14	do.	do.	do.	-	1	3	6
Loss,	0	2							
	108	0					52	15	6

Now the following is the account of the average loss in scouring, picking, and drying the Refina, Fina, Tercera, and Cahidas of the best Spanish piles, the price of each as imported, and the consequent value of the respective parts, when so purified.

Refina loses in scouring and picking about $3\frac{1}{2}$ lb. per score.
Fina - - - about 4
Tercera - - - about $4\frac{1}{4}$
Cahidas - - - about $5\frac{1}{2}$

	s.	d.						s.	d.	
Refina,	at 6	9	per lb.	its present price, is,	scoured and picked,		-	8	2	per lb.
Fina,	at 5	9	-	-	-	-	-	7	$2\frac{1}{4}$	
Tercera,	at 5	4	-	-	-	-	-	6	$9\frac{1}{4}$	
Cahidas,	at 3	6	-	-	-	-	-	4	$9\frac{3}{4}$	

Hence it follows, that

	lb.	oz.	dr.		s.	d.			£.	s.	d.
Clean Refina,	42	0	0	at	8	2	per lb. will give	-	17	3	0
Fina,	7	8	0	at	7	$2\frac{1}{4}$	-	-	2	13	$10\frac{1}{4}$
Tercera,	2	4	0	at	6	$9\frac{1}{4}$	-	-	0	15	$2\frac{3}{4}$
Cahidas,	1	3	6	at	4	$9\frac{3}{4}$	-	-	0	6	$1\frac{1}{4}$
	52	15	6						20	18	$2\frac{3}{4}$

Now as the average loss of weight in the examples quoted, did not actually amount to one-half, and as the wool in question was, for the reasons abovementioned, unusually foul, we might justly have expected the most valuable part of

the fleece to have weighed one or two pounds more than the sum stated. Let us, however, take it as it stands; then 20l. 18s. 2d¾. divided by 53, will give 7s. 10½d. per lb. for the average value of the wool in all its parts in the clean state, and 3s. 11¼d. per lb. for the same wool in the full yolk. If, therefore, the fleeces weigh, on an average, 5 lb. the value of each will be 19s. 8d¼d.; and so in proportion for a greater or less weight.

This is the price which the manufacturer ought to give for the finest Merino-Ryeland fleece wool in the full yolk, when Spanish Refina is at its present value of 6s. 9d. per lb; receiving, at the same time, an allowance for the expences of sorting, scouring, picking, and drying. All these operations are, in a certain degree, necessary to Spanish wool of commerce itself; but not to the same extent as to our wool in the yolk. The sorting does not cost 2d. per lb. of the clean wool; and the scouring being accomplished only with the yolk of the wool, and one of the vilest of substances, urine, must be sufficiently cheap. If we suppose the whole superior expense of the operation, labour, fire, and all materials included, to be 4½d. per lb. of the clean, and 2¼d. per lb. of the raw wool, then the value of the former will be 7s. 6d. per lb. and of the latter 3s. 9d. through the whole fleece; and a fleece weighing 5 lb. will be worth 18s. 9d. and so in proportion.

What the calculation ought to be with regard to the same wool washed on the sheep's back before shearing, I am unable to say, having had no experience of this kind with regard to any of my finest wool. All conclusions in this method must, indeed, be extremely inaccurate, as every thing depends on the mode and degree of washing, which is a gross operation, and must vary the cleanness of the fleece in a much greater degree than the accidental differences of season, or acquired filth under careful management. In the calculations which I have made of the waste of the wool in the yolk, all these differences are more than allowed for; especially when it is considered that, in every case specified, the scouring has been performed on small quantities, and must, therefore, have been more wasteful than if it had been conducted on a large scale.

In order farther to illustrate the value of Merino-Ryeland wool, of the best quality, let us now ascertain to what extent it reaches, when scoured, in the manufacture itself, comparatively with Spanish wool of commerce.—Here, as on former occasions, let us resort for information to actual experiments.

					yds.
In 1800,	Refina wool	clean scoured and picked,	$46\frac{3}{4}$ lb.	made cloth,	$29\frac{1}{4}$
1802,	do.	do. -	$46\frac{1}{4}$ lb.	-	$30\frac{1}{4}$
1803,	do.	do. -	$44\frac{1}{4}$ lb.	-	$28\frac{1}{4}$
1804,	do.	do. -	42 lb.	-	$26\frac{3}{4}$
			$179\frac{1}{4}$ lb.		$114\frac{1}{2}$

The last piece of cloth was much thicker and more leathery than it ought to have been; and I am informed, by a letter from the manufacturer, that if he had been aware of the ready disposition of this wool to felt, he should have kept the cloth a shorter time in the mill, and have made from one and a half to two yards more, or $28\frac{1}{2}$ yards of cloth of the proper substance. Let us, however, take the items as they now stand. The whole produce of cloth from $179\frac{1}{4}$ lb. of clean wool will then be $114\frac{1}{2}$ yards. Now 60lb. of good Spanish wool are required to make 30 yards, or, according to Mr. Naish, * 29 yards, of the best wool-dyed broad-cloth. Let us, however, suppose 30 yards. These 60 lb. of wool are, by scouring and picking, reduced to 50 lb. Therefore, as 50 lb. are to 30 yards, so are $179\frac{1}{4}$ lb. to $107\frac{1}{2}$ yards; instead of which $114\frac{1}{2}$ yards actually were made; and according to Mr. Naish as above, upwards of 116 yards should have been produced.

It seems to be agreed among manufacturers, that, the finer the wool, the farther it goes. This is probably owing to its flexibility and inelasticity; in consequence of which it readily entangles itself in the various processes of spinning, weaving, and milling, and does not fall out and waste in these and the subsequent operations. This principle, though it may have a maximum, determined by a certain degree of strength, and therefore of coarseness, in the wool, must doubtless, in conformity with experience, be admitted as generally true. Let us, therefore, examine the result of the single experiment of 1804, in which the wool was finer than in the former instances. As 50 lb. are to 30 yards, so are 42 lb. to somewhat less than $25\frac{1}{4}$ yards; instead of which, my wool produced $26\frac{3}{4}$ yards; and, according to the report of the manufacturer above stated, would have produced $28\frac{1}{2}$ yards of cloth of the usual thickness and solidity. It may, therefore, be justly concluded, that fine Merino-Ryeland wool in the clean state goes farther in the fabric than an equal weight of the best Spanish in the same state, and therefore is, in that respect, more

* Bath Society's Papers, Vol. X. Page 70.

valuable to the manufacturer. This circumstance ought certainly to add somewhat to the price of the Merino Ryeland wool; and, if no addition be actually on that account made, should render the wool more desirable to the clothier. *

Upon the principles which I have already laid down, there can be no difficulty in assigning the causes of this superiority. The Merino sheep in Spain remain at rest during a certain time in the rich vallies; and, from this luxuriance of food, become tolerably fat. They are then reduced in flesh by a long journey to the mountains, where they rest, again increase in obesity, and are once more reduced by travelling to be again fattened by repose among the rich herbage of the lowlands. These opposite states of rest and motion, accompanied as they are with a corresponding degree of nutrition, must be very unfavourable to the equal growth of the wool, and, therefore, to the tenacity and uniform strength of the filament; while, on the other hand, a well-managed flock of sheep in this country, kept in nearly an equal state of exercise and flesh during different seasons of the year, must furnish wool of more uniform strength, and therefore less subject to waste in the different processes of the manufacture. Add to this the superior flexibility and inelasticity of the Merino-Ryeland wool; and, farther, that our wools are not as yet adulterated by being mixed with that of either diseased or dead sheep, or of lambs, like those of Spain.

I cannot tell how far the clothiers will agree with me, when I urge that a still greater part of this advantage may, probably, be derived from a superior length of staple in the Merino-Ryeland wool. The benefit of this length will readily be allowed in casimir, because it admits of finer spinning, which much contributes to the thinness, closeness, and fineness of that fabric; and even in broad-cloth it must allow the filaments to be more intimately twisted, and therefore render them less liable to fall out from any subsequent violence. Some persons have, indeed, contended, that only the ends of the filaments are drawn out to supply the pile on the face of the cloth; and, therefore, that a longer filament is disadvantageous, by not furnishing a sufficient number of ends for this purpose. To this reasoning I cannot agree. I can never believe that the rude hooks of the teazle, impelled by a strong force, should, by a sort of living power, select only the natural extremities of the

* This advantage must, however, be lost, when the wool is become much finer in the filament, and consequently weaker, than the best Spanish; an evil soon remedied by the introduction of a somewhat coarser ram.

filaments, and gently pass over the tender intermediate parts. Nothing, indeed, would be more easy than to demonstrate, that such a selection could not only never produce a proper pile, but that it must absolutely destroy the very substance of the cloth. There can be no doubt that, by the operation of teazing, the filament is irregularly broken in various parts, and that these ends, thus drawn out, are reduced to a regular length, and disposed in uniform order, by the shearing and dressing, so as to give that smooth and even face, which we see in our best cloths. To this purpose a certain length of filament must probably contribute.

But, be the causes which I have suggested just or not, it is proved, by the unerring test of experience, that clean Merino-Ryeland wool, of proper fineness, suffers less waste in the fabric than the native Spanish of commerce, and therefore is, weight for weight, more profitable to the manufacturer.

After these calculations, it may reasonably be asked, at what price I have actually sold my wool. To this question I find it difficult to give a precise answer. My flock, as I have before stated, being made up of sheep of different degrees of fineness, must have produced fleeces very different in value, and therefore in price. That which was best, and equal or superior to the Spanish, I have never sold at all in the state of wool; but have had it manufactured into cloth or casimir, which I have either used in my family, given away to my friends, or sold to the draper. Were I to state at what price I have sold these articles, and what they cost me in the manufacture, however simple the calculation may appear, I can assure the common reader that the tale would afford him little information. I have no wish to disclose any secrets of the trade, which I may have learned from the liberal communications of those who profess it; but the manufacturer will gain sufficient knowledge when I inform him, that, in 1804, I sold the piece of blue broad-cloth already described for 24s. per yard; and, at the same time, a piece of thin casimir, made of somewhat inferior wool, at 7s. 3d. per yard, to the same draper, both ready money, and without deduction of length: and I may add, that for the whole piece of blue cloth, No. 3, now exhibited to the Board, I have by several persons in the trade been offered 30s. per yard. I do not say that this could be considered as the current price to the manufacturer for goods of the same value in the common course of commerce; some allowance should, doubtless, be made for the novelty of the object; but these cloths would not have excited curiosity, if they had not possessed uncommon merit; and any manufacturer will see that, after

all due allowance of this kind, the value of the wool, comparatively with the present price of Spanish, must be more than that which I have stated.

In the mean while, I am endeavouring to bring the wool of my whole flock as nearly as possible to one standard. To this point I am every year rapidly advancing; and when I shall have effected it, which I trust will be in three or four years, have little doubt that I shall readily obtain the full value for all the wool of which I may wish to dispose, whether in form of the raw material, or of cloth.

The account which I have hitherto given of Merino-Ryeland wool applies only to that of the ultimate degree of fineness; or, at least, of that degree which is equal to Spanish wool of commerce. Having always directed my attention to that point, I have either not registered, or have mislaid and forgotten, many of the observations formerly made during the course of the experiment; for which reason, I cannot detail the consequences of crossing in the intermediate degrees. I have, however, observed, that the first mixture of the Merino with the Ryeland adds about $\frac{1}{3}$, or somewhat less, to the fleece of the latter breed; without appearing to have much influenced the fineness of the filament. In after-crosses, some curious circumstances occur. It is well known that the wool of the Merino and the Ryeland are both short, and the latter the shortest; neither of them usually exceeding, in the ewes, $2\frac{1}{2}$ inches in length. But the second or third mixture of these breeds carries the wool of the ewe to the length of four, and sometimes six inches, with great increase of weight, but still considerable coarseness in the filament. The fourth cross brings the wool to the Spanish standard, in point of fineness, and greatly reduces the length, leaving it still somewhat greater than that of the pure Merino. In every stage of the experiment, the wool is profitable, either in quality or weight. A more particular account of the increase of wool value in the early crosses may be seen in the publications of Lord Somerville and Mr. Tollet.

I have endeavoured to prove above that, in every known climate, and under all kinds of regimen, which are consistent with the health of the Merino breed of sheep and its crosses, the wool maintains an equal degree of fineness. Though this position be on the whole true, it is probably not so in extreme cases. Temperature and extent of nutrition may have some influence on the size, firmness, and length of the filament. Some writers have attempted to prove the power of heat in enlarging the filament by shewing, what is certainly true, that the first spring of wool,

for a considerable time after shearing, is coarser than the average of the fleece during its subsequent growth; whence, as the wool, like the nails, grows by propulsion, the outer extremity is always the coarsest part.

It is not, however, certain that this argument is not founded on a fallacy. The growth of wool is not mere propulsion. There is, doubtless, in every filament, some circulation of juices derived from the organized bulb from which it rises; and, for ought we know, shearing might produce a tendency to a grosser filament in the hardest winter, just as cutting human hair is said to make it become stronger. If the effect be the consequence of heat alone, that heat having uniformly changed through successive seasons, it must follow that every filament has the form of two cones, joined together by their apices, or points; and as the skin of the animal must, from well-known causes, be hotter before shearing than afterwards, that part of the new shorn fleece, which was next the skin, must be coarser than the wool which springs immediately after shearing. These points I trust that I shall hereafter be able to investigate by actual microscopic observation; and, in that case, shall not fail to communicate the result to the Board.

I have hinted the possibility of some effect being produced on wool by the difference of nourishment. Common opinion has gone so far as to assume that fine and short grass is indispensable to the production of fine clothing wool. I have already proved this to be false, with regard to the wool of the pure Merino; and my finest-woolled sheep of the cross breed, in addition to fresh grass, rouan, and hay, have been uniformly fed, in their respective seasons, with rape, Scots cabbage, and vetches; and, occasionally, with linseed and oil-cake. It is indeed acknowledged, that, other things being equal, the weight of the fleece will, within certain limits, be proportioned to the quantity of food with which the animal is supplied. This may be, in part, owing to some increase in the length of the filament; but it probably arises also from some increase of its diameter.* I have indeed no doubt that both these effects take place, in an especial degree, where a sheep is so fattened as to be fit for the butcher; in which case they are accompanied with a considerable augmentation of the weight of the fleece. On the other hand, a sheep which is lean, either from want of food, or from slow disease, has the filaments of its fleece shortened, and rendered finer; and I know that this effect occurs in the pure Merino, as well as in its crosses. The wool, at the same time, becomes of a more

* Whether the specific gravity of the filaments be in this case increased, I have not examined.

opake whiteness, probably from its being more spongy, and less inveloped in the yolk, which gives the fibre greater transparency, and a yellowish tinge. In this state the wool is brittle, and less fit for manufacture.

If, however, a sheep be fattened to a certain degree, it matters not, with regard to the wool, whether he have been fed on the grass of the Sussex Downs, the luxuriant herbage of the vale of Gloucester, or the turnips of Northumberland; and, on the contrary, if a sheep be starved, his wool will become just as fine and weak on cabbages and oil cake, as on the shortest and barest pasture. The only difference is, that under the use of the grosser food the animal will be more apt to fatten, and therefore will have a coarser fleece; while, on the short herbage of the Downs, his utmost labour, in pursuit of food, will seldom be more than just sufficient to keep him in moderate and healthy flesh; and, therefore, will not admit of that deterioration of fleece, which attends obesity.

There is no subject which more abounds with ill-founded prejudices than rural economy. It seems to have been received as an axiom with regard to sheep, that at a certain season of the year, a fresh shoot of wool takes place, and detaches the old fleece, just as the adult tooth displaces that of the infant, or as the newly-rising sap causes the dead leaf of the beech to fall. Whatever truth there may be in this principle in our native breeds of sheep, it certainly does not extend to the Merino, or such of its crosses with our breeds as I have seen. On this subject, the French have made many decisive experiments. They have allowed the wool of the Merino to grow, on the same animal, for two or three successive years, without perceiving that it has any greater tendency to shed, than what arises from its length, which naturally renders it more subject to the effects of mechanical force. They have made the experiment in various ways; but in none more ingeniously, or perhaps decisively, than by annually shearing half the animal lengthways, and leaving the other half for two or three years unshorn. The total products of the two sides being then compared, have been found very exactly to agree in weight. Of the French wool so managed I have seen two specimens from the Rambouillet flock; one, which is in my possession, of the growth of two years, given by Lasteyrie to my son, Dr. Charles Parry; the other, of three years, lent me by Mr. Drake. I also, in 1802, made the experiment for two years on the fleece of one of my own Merino-Ryeland rams. These specimens are from six to nine inches in length; and, after the nicest examination which I have been able to

make with the naked eye, I cannot discover any weakness or inequality throughout the whole extent of the filament. I am, therefore, persuaded that the wool of these breeds will grow to an indefinite length; with no other tendency to fall off at any particular season, than occurs with regard to the hair of the human race.

Were it not openly doubted by the ignorant, it would scarcely be worth while to mention that the wool of the Merino-Ryeland breed, filthy and discoloured as it may appear in its native state, becomes, by scouring, beautifully clean and white.

So far as to the wool of the Merino-Ryeland sheep. Let us now consider that of the lamb.

Of native Merino lambs wool, as I have before stated, a quantity comes over to England, and is, in general, found to be much coarser, and more wiry than the sheep's wool. I have adduced the examples of the Infantado and Paular flocks, to prove that this takes place in some varieties of the species much more than in others. It appears to me that the 4th and 5th crosses of the Merino-Ryeland with the Negrette ram have also this tendency. Six or seven lambs, which have this year fallen from such a mixture in my flock, which I made by way of experiment, are all easily distinguishable from the rest by the coarseness and shagginess of their fleeces, especially about the rump. Whether the finer wool, which often succeeds in the sheep, is a continuation of the same filaments as those which were so much coarser in the lamb, or whether the coarser filaments are mingled with finer, which afterwards grow up to form the fleece of the sheep, while the coarser cease to spring, I have not yet had opportunity to examine.

From my whole lamb produce, which has generally fallen from the middle of January to the middle or latter end of March, I have shorn, at the latter end of July, from $1\frac{1}{2}$ lb. to $1\frac{3}{4}$ lb. each of unwashed wool. Some of the fleeces have weighed even $2\frac{1}{2}$ lb.; and were the lambs by proper care brought to the same standard, in point of size, I think it highly probable that they would give a full average of 2 lb.

Of my lambs' wool sorted, in 1802, $89\frac{3}{4}$ lb. were reduced, by scouring, to 52 lb. 2 oz. and manufactured by Mr. Hicks, of Eastington, into $33\frac{3}{4}$ yards of good cloth, which, at that time, I sold to a draper at 17*s.* 6*d.* per yard, credit price, and with the usual deduction of length.

In 1804, much improvement had been made in the wool, and the price of cloth

was considerably advanced. From lambs of that year, 72 lb. of selected wool, when scoured and picked, became 42 lb. which were manufactured by Mr. Naish of Twiverton into $28\frac{1}{2}$ yards of blue ladies' broad cloth, dyed in the wool. This cloth I sold for 21*s.* per yard, ready money, and without deduction of length. It was universally agreed by some hundreds of observers, that it had seldom been equalled in fineness and softness; and three gentlemen, whose names I forbear, on the present occasion, to mention, and one of whom was the draper who purchased the cloth, publicly declared, that having had these coats constantly in wear, from six to nearly twelve months, they never had any which so long remained unaltered as to pile and beauty.

The loss in scouring the wool, which made these pieces, was little more than one-third. In both instances it was sorted in the same manner, and about two-fifths of the whole fleece rejected. As this latter wool was from the coarser parts, and was, consequently, the dirtiest, it must have suffered in scouring a proportionably greater waste. The lambs' wool being, however, much cleaner than that of the sheep, the waste throughout the whole fleece would not, probably, if the scouring were properly performed, equal two-fifths of the whole weight in the yolk. Now, supposing the best Spanish lambs' wool, in the imported state, to be worth 4*s.* 3*d.* per lb. and to waste in scouring 3 lb. to the score, then the clean wool will be worth exactly 5*s.* per lb.; and in mine, 20 lb. being reduced by scouring to 12 lb. at 5*s.* per lb. will be worth 3*s.* per lb. in the yolk, throughout the whole fleece. If the fleece weigh 2 lb. this will give 6*s.*; if $1\frac{3}{4}$ lb. 5*s.* 3*d.* per lamb. I must, however, remark, that 4*s.* 3*d.* per lb. is at present a low price for Spanish lambs' wool of the finest kind; and that, according to the opinion of every manufacturer, no cloth equal to those which I have exhibited having been ever made from the latter, my lambs' wool ought to bear a proportionably greater price.

Having finished all which is so far necessary as to the wool of these sheep, let us next proceed to the carcase.

CHAPTER II.

Carcase of the Merino-Ryeland Sheep. Size. Superior profit and convenience of small Breeds of Sheep. Form, and other Circumstances, most connected with a Propensity to fatten; constituting what is called Beauty. Resolvable into Fitness. New Leicester Sheep, supposed to be Models of Beauty, tried by this Test. Merino Breed singularly defective in that respect; and why. Already greatly improved in England, and capable of being made sufficiently perfect. Merino-Ryeland Cross better in Form than the pure Merino. In Crossing, the Posterity follow the Sire in Skin and Wool, and the Dam in Carcase. Capacity of fattening. Number of Sheep kept, and extent of Land. Effect of Breeding in and in. Hardy Sheep. Rams generally horned. Seldom two Lambs at a Birth. Skin like that of the pure Merino.

In point of size, my Merino-Ryeland sheep are at present, equal to the Ryeland. There is no subject which has more divided agriculturists than the question as to the comparative profitableness of the larger or smaller breeds of animals. The farmer, when he can produce to the butcher, or exhibit at the market or the fair, an ox pre-eminent in fatness and size, conceives himself to be far elevated above his fellows, and considers the question as ultimately decided in favour of the larger breed. Nearly of the same rate of intellectual power is the journalist, who gravely tells us, that a large animal must certainly be more valuable than a small one, because it sells for more. I fear that this vain and precipitate conclusion has been too much promoted by the decisions of well-meaning societies and clubs, the terms of whose premiums sometimes rather go to abet fashionable prejudices, than to compare and distinguish between dubious facts. With regard to what is called fatting, the grand question is, which breed of animals, or which abstract form or qualities in any breed, converts into the greatest quantity of equally good flesh a given quantity of the same food in the same time: and so far as this point alone is concerned, it matters not whether the flesh be on one animal or on three. It ought, therefore, to be an indispensable condition of every premium for fat cattle, that the actual quantity and quality of food, and the expence and time of fatting,

as well as the precise increase of weight of good flesh which they have acquired, should be accurately and faithfully stated.

Upon the whole, notwithstanding all the theoretical reasonings on the subject, it appears to me that experience is rather in favour of the smaller breeds of neat cattle and sheep. This was the general result of the experiments made by the late Duke of Bedford, and related by his direction in the 23d and 26th volumes of Mr. Young's Annals of Agriculture. The same thing occurred in the experiments recorded in the Bath Agricultural Society's Memoirs by Mr. Billingsley and Mr. Davis.* From a communication made to me by the latter gentleman, I find, that while the Cotswold sheep increased in weight $\frac{1}{7}$, the Leicester and Dorset $\frac{1}{5}$, and the Wilts less than $\frac{4}{9}$, the Ryeland, during the same time, and on the same land, gained $\frac{5}{9}$.

It is true that all these experiments have been, in some respect or other, defective; but, in the 10th volume of the Bath Society's Memoirs, there is an account of the comparative experience of several years on an entire farm, between the Wilts and South Down breeds; which, as it is the gross result of the whole produce on a great scale, decides the question for ever between those breeds, under similar management. The same extent of land, in the occupation of William Dyke, Esq. of Syrencot, which used annually to support from 320 to 360 ewes, and about 300 lambs, of the Wiltshire breed, afterwards fed of the South Down 460 breeding ewes and 430 lambs, each of which sold from two to three shillings more than the Wiltshire; and raised the annual return from £450. to £724. 10*s*. Besides which, from 12 to 15 tons of hay were withdrawn from the South Downs, during the season of 1803, and expended elsewhere.

At the same time that a small sheep becomes fit for food from a proportionably smaller quantity of keep than a large one, the joints, into which he is divided, are better accommodated to the use of common families. In this respect, however, there is certainly a minimum in point of convenience, which I should consider as lying between 14 and 18lb. a quarter. To this size wethers of the Merino-Ryeland breed are easily brought. It is well known that a great deal of the success, in this respect, depends on the constant administration of a sufficient quantity of proper food during the whole life, not only of the animal himself, but of several preceding generations. From actual experiment I find that my shearling rams, in the same state of flesh, have gained from 10 to 12 lb. each in weight, during the last three

* Volume vii. Page 352. and viii. 371.

years; and my ram hogs are now, (in the month of March,) to all appearance nearly as heavy as those of 1804, when six months older. The greatest weight, in the month of September, of a living 4-tooth ram of my flock, in store order, has hitherto been 120 lb.

The capacity of quick growth and early fatness, is generally supposed to be connected with particular circumstances of form and proportion. These circumstances Mr. Cline, in a paper addressed to this Board, has attempted to explain on physiological, and, as it appears to me, just principles. He sets out with considering the external form of the animal as being of consequence, only as it is indicative of the internal structure. The power of converting food into flesh chiefly depends on the relative size of the lungs, which must be proportioned to the mean circumference of the chest of a given form, which should be as nearly as possible circular. This structure will necessarily influence the distance between the shoulder blades, and fore-thighs, producing a broad chest. The pelvis in the female should be wide and deep, for the purposes of easy gestation and labour, and therefore for the production of sound and healthy offspring. On the breadth of the pelvis will depend that of the loin, and the goodness of the hind-quarter, which comprises the size and distance of the hinder thighs. From these points must arise a straight back, and large barrel; which regulate the dimensions of the stomach and intestines, and, therefore, the power of taking food. Large bones are no sign of strength, but rather connected with a sort of ricketty disposition, which always implies weakness, and an incapacity of nutrition; besides which, they are not the food of man. The smaller therefore they are, the better. This principle strongly applies to the head, which, when large, endangers the ewe at the birth. Horned heads are much heavier than those which are hornless. Long legs are only an excess of offal, and require a proportionable length of neck, in order to permit the animal to feed. Muscles constitute what is commonly called lean, and are the instruments of motion. They should, therefore, be full and large.

If these circumstances are true, and their final cause rightly explained, they are resolvable into the general principle of fitness, and therefore, according to the opinion of certain critics,* are those points which, so far, justly constitute thebeauty of a sheep.

All these points are supposed to be united in the New-Leicester sheep; which is,

* Pulchritudo corporis aptâ compositione membrorum movet oculos, et delectat. M. T. Ciceronis de Offic. lib. i. 28.

accordingly, exhibited as the ultimate standard of excellence; and therefore as a model of perfect beauty in this species of animals. Let us more minutely examine its pretensions.

The Leicester sheep has a peculiar temper and disposition. He is naturally dull and indolent. He is scarcely sensible when you come near him. Any fence confines him. He never runs about from vivacity, or the love of change. His whole object, the very end of his existence, is to fill his belly. He moves for food to a short distance all around him, soon satiates himself, and then lies down to rest. From this genius and mode of life, all his food readily becomes chyle, soon fills his vessels, and, as is usual in all animals in such cases, is in great abundance poured out of the vessels in form of that secretion which is called fat, and which, among other useful purposes, is certainly a wise provision of nature to remove a degree of distention in the vascular system, which might, probably, in various ways, soon become fatal. The animal therefore becomes loaded with fat; which, at an early period of life, is always deposited in that sort of net-work immediately subjacent to the inner skin, called, from its structure, the cellular membrane, or texture, and, from its use, the adipose membrane. It is evident, therefore, that a Leicester sheep, under proper circumstances, is fit for growing fat.

But what is the fitness of fat itself? A certain proportion of it, according to the modes of cookery in England, and I might add, almost in England only, is doubtless coveted by every palate; and a larger proportion is desired by the labouring part of the people, who like it in their broths, their puddings, and with their fried vegetables. But the number of such persons, who are able to purchase mutton, is comparatively small. Among the middle and wealthier classes of people, and more especially their domestics, very fat mutton on the table is an object of utter aversion. It is, indeed, very much to the liking of the cook, who receives, as her perquisite, all which either the fire separates, or the dainty palate leaves uneaten, and sells it as tallow to the manufacturer of candles or soap. The proportion of this mutton so lost would astonish those who have not seen the immense thickness of fat which loads the surface of the loins, shoulders, and necks of the prize sheep, so constantly exhibited in large cities, to the great admiration of the gaping multitude. But the tallow of a sheep is always less valuable than the lean taken in connection with a due proportion of the fat with which it is spread, or interlarded; and, perhaps, for this very reason among others, the Leicester mutton usually sells for common

consumption at a halfpenny or a penny per lb. less than the Ryeland, Welsh, or South Down.

But what, in the Leicester breed, is the nature and proportion of the muscular substance, or lean? Exactly what must happen from their age and habits of life. The muscles of young animals are always small. They do not attain their ultimate size till adult age. Whatever may be the vulgar opinion as to the Leicester sheep, at the age at which he is killed he is immature, and his muscles scarcely half grown. Farther, muscles much used, enlarge; not used, shrink and decay. Hence the leg of a postilion is almost without a calf, while that of a chairman is exuberantly full. Were the strongest man to keep his arm for a year in a sling, experience shews that the muscles would be reduced to less than half their original solidity and bulk. So wild birds, which are much on the wing, have plump pectoral muscles, or breasts; while those which only walk, and the former, when domesticated from the egg, have the breast comparatively thin and flaccid. Examine the muscular substance of a Leicester sheep, and you will find it exactly in the same state. I will venture to assert that the lean of one of those animals at $2\frac{1}{4}$ years old, weighing 25 or 30 lb. a quarter, is scarcely heavier than that of a Ryeland of proper age, weighing 16 lb. The fat on the loin in this breed, is to the lean as 5 or sometimes 6 to 1; and Mr. Marshall quotes an instance of an old New-Leicester sheep, the quarter of which, weighing 26 lb. was reduced to $2\frac{1}{2}$ lb. when divested of its fat.*

Farther; the red colour of the internal parts of animals arises from the blood which is contained in the vessels; and the redness of the blood itself depends on the oxygen which it imbibes from the air, chiefly in the process of respiration. Now exercise, by increasing the action of the heart, drives a larger quantity of blood, in a given time, through the lungs, and therefore accelerates respiration. The same cause propels the blood more copiously through those minuter vessels, in which otherwise it would either not exist, or else not be perceived by the naked eye. Hence the blood, and all the parts through which it most circulates, are reddened by exercise. We see this difference in individuals of the human race, who become pale and sallow from indolence, but, from habitual exercise, obtain a clear carnation; and what is called the bloom of health. We see the difference in the common fowl, which, when at large, and feeding at the barn-door, and in the fields, has dark-

* Midland Counties, vol. i. page 399.

coloured flesh, but which becomes white by domestication and confinement. So in sheep; the muscle of the Welsh, Portland, or Ryeland, which run about in quest of food, is brown when dressed, and emits much gravy of the same colour; while the lean of the indolent Leicester is pale, and imbued with comparatively colourless juices. To the same end contributes the age at which the animal is killed. He dies prematurely; for he becomes fat before he is adult. His flesh and juices have, therefore, the same pallid hue, relatively to those of the full grown Ryeland, that the flesh of a calf has to that of an ox. It is acknowledged that the flavour keeps pace with the defect of colour. There can be little doubt that, under the same circumstances of close confinement and early fattening, the Ryeland or South Down mutton would be as pale and tasteless as that of the Leicester. *

If then the form of that sheep is necessarily connected with his disposition to inactivity, and early proneness to obesity, it is evident that it unfits him for obtaining a large proportion of well-flavoured muscular substance.

It is common with all animals to become fat about the internal parts, only at an advanced period of life. When sheep are sold to the butcher by weight, these parts are not usually weighed with the joints and the rest of the carcase, but are considered as belonging to the fifth quarter; and, therefore, as the profit of the butcher. Now if, in this case, no deduction be made for its deficiency, the Leicester breed of sheep, which is always killed in its infancy, and therefore is more defective in this respect than any other breed, is, comparatively speaking, unfit for the butcher. If, on the other hand, the butcher, on that account, gives less per lb. for the quarters, the loss only changes its object, and the breed becomes, so far, unfit for the grazier. Again, the Leicester sheep loves to feed and fill himself within a small space of ground; and, therefore, requires rich and luxuriant herbage. On the contrary, on moderate or poor keep, obtained at the expence of exercise, this breed acquires less flesh in a given time than the Ryeland or South Down. It is therefore, comparatively, unfit for nearly half the pasture-land in this island.

A Leicester ram is sluggish, and naturally inefficient; the ewe is often barren, and generally a bad nurse; and the breadth of shoulder in the lamb endangers its own life, and that of its dam, in yeaning. They are therefore, comparatively, unfit for propagation.

* This appears to be actually the case. Annals of Agriculture, vol. xxvi. p. 433.

As to the merit of their form in a picturesque view, I do not presume to decide; but I should scarcely expect to see it chosen for representation in any picture, which was not expressly intended for agricultural illustration, except by that artist, who, having always furnished the shoulders of his full-grown clowns with the heads of children, fancied the composition beautiful.

For what then is a perfect Leicester sheep fit? On rich land, he is calculated, at an early age, to produce, for eating, that which cannot be eaten, but which is good for the manafacture of soap and candles.

Is there then, it may be asked, no fitness, and therefore no beauty in that form, which is now so generally recognized as perfect? I think there is. I have allowed that the abstract principle is well-founded; but I deny that it is either universally applicable, or that it is true in the extent to which it is carried in the New-Leicester race of sheep. Every thing is fit, and therefore beautiful, only when in its proper degree as well as place. A considerable length of lower limbs in the human figure is beautiful, as we see it in the paintings of Cipriani and Angelica Kauffman, but is extravagant and disgusting in the excess to which it is sometimes carried in the designs of Parmegiano. Every object which exists has various relations with other objects; and is then most useful, when it has the greatest number of those relations. That is a kind of insanity, which sees objects only in one light, or under one connection; and he, who, rivetted to a single train of ideas, regards a Leicester sheep as a model of general fitness, and therefore of beauty, reminds me of the huntsman, who, being interrogated by Lord Mansfield whether a certain dog. kennel was a nuisance, declared, on his oath, that he liked the smell of it better than that of a rose.

In these points, which, when justly regulated, are doubtless excellent, it cannot be denied that the pure Spanish breed is, in its own country, grossly deficient. But at this we cannot wonder, when we attend to its history. We have seen that, in Spain, it is merely a wool-bearing animal, in which figure is no more important than in a silk-worm, or a cotton-plant; that a great proportion of the rams are killed as soon as yeaned; that only a few wethers are made; that the animal is rarely eaten, except by the shepherds and other labourers, and then never fattened; and that Madrid, near and through the gates of which myriads of this breed annually pass, actually depends on Barbary for its supply of mutton.

If, indeed, the principle be admitted, that good forms cannot be obtained without

an uniform degree of nutrition, it is impossible that they can ever exist under the present habits of the Merino race in Spain. Sheep never thrive well on any food when kept together in great numbers. It is also necessary to the economy of these, and various other animals, that, after having finished their meal, they should lie down and rest for the purpose of chewing the cud. As the food is not regularly taken, the stomach in different animals composing large flocks must become full during every different minute of the day; notwithstanding which, they must at stated hours take their daily journey of from five to fifteen English miles. By this forcible deviation from the laws of nature, their digestion is impeded, and their nutrition, and consequent growth, is proportionably defective.

Now I would ask any candid man, whether, under such circumstances as these, continued during several centuries, the South Down, or any other of the best native breeds of sheep in this island, could possibly have been in a superior state as to carcase?* I would also appeal to the same person, whether experience does not justify us in concluding, that by the same care in breeding and nourishing, which has been long practised on the South Down sheep, the Merino race itself may not, in a few years, be much meliorated, and, at length, in every circumstance of general usefulness, fully equal those which are quoted in order to disgrace it?

In this respect very great improvement has already been made by Lord Somerville, whose ram, No. 20, must be acknowledged, by the most prejudiced, to have a beautiful form;† and if the throatiness, or dewlap, which is often found in these sheep, and which is merely a duplicature of the skin, be a fault, Lord Porchester informs me that he has succeeded in entirely getting rid of it.

In forming my own flock, my view has certainly been to place the finest wool on the best carcase. But, for reasons which I shall hereafter assign, I have thought the two objects incompatible at the same time during the beginning of any set of experiments in crossing these two breeds, and therefore have hitherto confined myself only to the former object, which I have, as yet, by no means fully accomplished. I have bred indiscriminately from all my ewes, and universally preferred those rams which had the finest fleeces; notwistanding which, my sheep are, in general, shorter in the legs and necks, have smaller bones, a rounder barrel, a

* It is chiefly a correspondence in principle to the great habit of the Merino race just mentioned, that is travelling, which has made the Wiltshire sheep probably the worst breed at this day existing in Britain.

† See a very exact delineation of this ram in Malcolm's Agriculture of the County of Surrey.

wider loin, and, consequently, a better hind quarter, than any pure Merinos which I have happened to see, except that particular ram of Lord Somerville, which I have already mentioned.

This change I attribute to the female, or Ryeland blood, which, in forming the progeny, acts most on the carcase, while that of the male, or Merino, chiefly affects the skin and fleece. This opinion is confirmed by the following facts.

Of the pure Negrette breed, a very large proportion of the rams is horned, while a few have short snags, and scarcely any are knots, or hornless. On the contrary, of the Merino-Ryelands of the 4th cross, a considerable number have no horns, or only snags; and I am disposed to believe that the proportion of these increases as we breed in and in from the same cross, though from horned rams. Farther; in breeding from the pure Merino, the ram lambs in carcase take after the father, and the ewe lambs after the Ryeland; and the same thing happens with regard to the fleece; so that the male offspring, in many instances, obtain pre-eminence in fine wool one generation before any of the female.

These facts shew the respective influences of the male and female in generation; and as, from what I have stated above, it appears, that the fleece is constantly improving from breeding in and in with the 4th cross, I may hope that at this period I may now be able to attempt a melioration of the carcase by that mode, so as in a very short time to exhibit its effects through a large proportion of my flock.

In the mean while, I wish it were in my power to give the Board any satisfactory information as to the fatting of my sheep. But, in this respect, I have been no better circumstanced than the Spaniards themselves. I am a mere breeding farmer, having hitherto looked only to the extension of my flock, and the improvement of my wool. I have, therefore, cut no lambs, except those which were either evidently coarse in their wool, or grossly defective in health or carcase; and I have kept all my finer breeding ewes till 11 or 12 years of age, when they were toothless, and dying with old age, and consequent infirmity. By this method I had a chance of lambs, which I wanted; and was tolerably well paid by the fleece for the keep of the ewe. The rams were obviously kept intire for the sake of a greater choice: and none of them were cut till three or four years of age, when they had been found unfit for my purpose, or that of any buyer. It is not, therefore, from such animals as these, that I have any right to decide as to the capacity of my sheep to fatten.

This will farther appear to the Board, when I state to them the extent and produce of my farm, and other food employed, in connection with my actual stock.

I occupy 160 acres of land, of which 90 are four inclosures, each from 20 to 30 acres, of Down, lying very high, dry, and without shelter; but, nevertheless, in moist seasons, for the most part productive. The rest is, on the whole, tolerably sheltered, and divided into about 10 inclosures; of which about 20 acres are arable. I have no water meadows, and I cannot depend on a spring of grass for my sheep earlier than the middle of May. Last summer I made about 40 ton of hay, a good deal of which was spoiled; and to compensate for my want of spontaneous green food, I kept about 20 acres of rouen, for the latter part of the winter and spring. I had also about half an acre of winter cabbage, and four acres of rape and turnip cabbage, all of which, from being sown or set too late, were very defective in produce. I had also no better a crop of ray grass on $4\frac{1}{2}$ acres of white oats, which is utterly choaked with weeds, and I am now reploughing. I must mention, in my own justification, that these unfavourable circumstances were owing to my having just come into the occupation of this land, which I found in the greatest possible state of neglect, but which I was, nevertheless, obliged so to appropriate, under all risks, as to supply my sheep in the best manner. I had, however, $2\frac{1}{4}$ acres of the best drum-head spring cabbages which I ever saw, and which, with my rouen, will, I trust, supply my sheep till the new grass. I had, besides, the aftergrass of seven acres, and one acre of worn out hop clover, or nonsuch. The hay will about serve through the year; in addition to which, if I can induce my sheep to eat them, I shall have consumed 30 sacks of refuse potatoes, raised on my own ground, a ton and a quarter of ground oil-cake, and 28 bushels of linseed.

My stock, from the middle of September, were the sheep which I have mentioned above, amounting to full 450, together with three farm horses, and within these six weeks, a fourth, which are fed from the farm, except with some corn while at plough, and, at other times, with a small proportion of grains mixed with their chaff. I had also a very useful draught jack-ass; and, till the middle of January, two cows. At this time, April 4th, I have likewise 195 lambs.

After this account of the nature and quantity of food employed relatively to my stock of animals, no one surely will wonder that I cannot boast of any peculiar success in what I never attempted, fattening. In fact, from the nature of my land,

the size of my inclosures, and my sysem of breeding, I have never less than from 30 to 100 sheep or lambs feeding together; and I am obliged to crop the grass of one field nearly bare, before I can send my division into another field: notwithstanding which, no one, who sees my flock, will deny that they are in as good store order as can be required for any purposes except those of ostentation; and under this management many of them have become fat, and have either been sold to the butcher at a price which was the very top of the market, or been killed for the use of my own family. Those which I have so expended, have been certainly superior in flavour to any mutton which I have ever purchased. The fat approaches in taste and consistency to that of venison, more than in any of the native English breeds. The wethers have reached from 12 to $15\frac{1}{2}$ lb. the quarter; and from a two-shear sheep of the latter weight, I have had $12\frac{1}{2}$ lb. of loose fat. A butcher or grazier would, doubtless, have done much more for them in this respect, than was consistent with my views. Experiments of this kind made by two gentlemen, whose names cannot be mentioned without insuring respect, have had the most satisfactory results; I allude to Lord Somerville and Mr. Tollet; the former of whose Merino-Ryeland sheep, exhibited at the Bath Agricultural Society, were in all points greatly admired by various gentlemen, who saw and tasted them. According to Mr. Tollet, a half bred Merino-Ryeland wether weighed $18\frac{1}{2}$ lb. the quarter, and had $18\frac{1}{4}$ lb. of rough fat; and, it is worthy of particular notice, that while his best South Down wether weighed $22\frac{1}{2}$ lb. per quarter, and had 18 lb. of rough fat, a wether of the same age, half Merino half Ryeland, fed with the former from a lamb, weighed 27 lb. the quarter, and had 23 lb. of rough fat.

On this subject I may add, that after shearing my 2-tooth rams on the 17th of June last, I weighed 11 of them alive, selected merely for the fineness of their fleeces, and found them to be 781 lb. or 71 lb. each. On the 16th of August following, or two months afterwards, having been kept with nearly 40 other rams of the same age, they were again weighed, and found to be $955\frac{1}{4}$ lb. or to have gained in the whole $174\frac{1}{4}$ lb. which was, on the average, upwards of $15\frac{3}{4}$ lb. each. That which had gained the most, had increased $20\frac{1}{2}$ lb.; and the least 11 lb. If the single one last mentioned had not been included, the first weight of the remaining 10 would have been 708 lb. and the second weight $871\frac{1}{4}$ lb.; giving an increase of weight in the whole lot of $163\frac{1}{4}$ lb. and, consequently, $16\frac{1}{4}$ lb. in each ram; or within about $1\frac{1}{2}$ lb. each of $\frac{1}{4}$ of their former weight. I do not profess to be much

conversant with the growth of our native breeds of sheep; but I presume that there are few instances, in which the same weight of carcase in rams, at the same age, selected without regard to form, and put with so many animals on moderate pasture in order merely to grow, and not to fatten, would, in the same time, have acquired a superior increase of weight.

They, certainly, though rams, and fed together in such numbers, and at so unfavourable a season of the year, proved fully equal in capacity of growth to the South Down and new Leicester wethers, in the experiment of the late Duke of Bedford, recorded by Mr. Young.* Those sheep appear to have been lean at the age when the comparison commences; notwithstanding which, to carcases weighing at least $\frac{1}{3}$ more than mine, the South Downs, in the same space of time, added nearly 3 lb. each less than mine, and the New-Leicesters only $14\frac{1}{2}$ oz. each more.

As far as I have been able to observe of this breed, the great progress which they make is from 2 to 4-tooth. The proper time to fatten them will therefore be from 4 to 6-tooth. But both periods may probably be accelerated by early and uniform luxuriance of keep. Perhaps also the same end may be promoted by breeding in and in. This has been suggested to me by Mr. Davis, who thinks the early fattening of the New-Leicester breed to be chiefly owing to this cause. He says, that this constant incestuous intercourse produces, in both sexes, a deficiency of the powers of generation, and of that of nursing in the female; reducing them to a state approaching to that of eunuchs, who, in all animals, are observed to have a peculiar tendency to obesity. This conclusion is derived not only from what takes place in the Leicester sheep, but from the case of the North Devon cows, which have constantly intermingled with those of a small district around them, and have long been famed for a form and disposition to fatten, which makes them much sought for by the butcher and grazier. These cows, however, are notoriously bad milkers, and go barren to the western fairs in greater numbers than those of any other breed. If this opinion be well founded, it shews that the Divine Law against incest has a physical, as well as moral end; and strongly illustrates the beautiful sentiment of the poet:

" In human works, tho' labour'd on with pain,
" A thousand movements scarce one purpose gain.
" In God's, one single can its end produce;
" Yet serves to second too some other use.

* Annals of Agriculture, vol. xxvi. p. 412.

This conclusion is far from being invalidated by the constant intercourse of the Merino flocks; for no more injury in point of health and vigour can be supposed to arise from a promiscuous connection between 50, or even 20 thousand individuals of which these flocks are composed, than between the whole of the two sexes of human beings in an entire nation. How far the principle of breeding in and in may be beneficially carried among those animals which are provided for the nourishment of man, it remains for experience to determine.

The Merino-Ryeland is a hardy race of sheep, living well in high and exposed situations, and, according to the constant observation of my shepherd, bearing extreme cold much better than great heat. It is much more easily confined by fences, and more docile and obedient to the shepherd and his dog than the pure Ryeland; and what is more extraordinary in the instance of my sheep, than a flock of 60 half Leicester half Ryeland ewes, which are now feeding near them. It is certain, however, that, in the same breed of sheep, great difference in this respect will arise from habits of feeding, and other treatment.

The ewes have two lambs at a birth, probably not once in two or three hundred times; and have very rarely a black lamb. They are seldom barren, and from the time that they are 2 shear, are excellent nurses. I once thought that they were incapable of rearing their lambs well at one shear; but subsequent experience has led me to conclude that I was deceived, and that, when properly nourished, they are, in this respect, equal to other breeds. The lambs are fully as playful as those of our native kinds.

The majority of the rams have long spiral horns, like those of Spain; and as, like them, they are extraordinarily salacious, they often use these natural weapons to the injury, and sometimes the destruction, of each other. In this respect, I presume, they resemble other horned rams.

The skin of the Merino-Ryeland has the same vivid tint of carnation as that of the pure Merino; and, like that, an astonishing degree of thinness, softness and looseness.

CHAPTER III.

Health and Diseases of Merino-Ryeland Sheep. Rot. Hydatids in the Lungs. Inflammation of the Chest. Giddiness. Scab. Foot-rot. Lambs require shelter when young.

In point of health, this breed appears to me fully equal to our native sheep. Some of my land, from having been undrained when I began to occupy it, is rather moist; from which cause, 4 or 5 of my oldest ewes have had diseased livers, accompanied with the fluke; but the proportion of the sheep so affected has been much smaller than that of the unmixed Ryelands, living on the same soil. In fact, I do not know that I have lost a single sheep from that disorder only.

In the latter part of the winter of 1803, or rather in the spring and summer of 1804, 4 or 5 of my ewes died of a disease, which, though perhaps common enough, has not been mentioned by writers on sheep. This was a great shortness of breath; during which, though the animal, in general, eat well, he gradually declined in strength and flesh, and after several months died. The lungs being examined after death, were found full of vesicles or bladders, from the size of a small pea to half an inch in diameter, containing a colourless transparent liquid. These bladders are denominated hydatids, supposed to be living animals, and called, by Linnæus, Tænia Hydatigenea. I have not yet met with any description of these hydatids, which correspond with their real structure. Whether they arose from the damp ground mentioned above, as they frequently occur and accompany the fluke in the livers of rotten sheep, I cannot tell. My land being now drained, I shall be able to form a better judgment as to the cause. The sheep were of middle age; but I had no opportunity of attempting any means of cure.

A few of my sheep have died of inflammation of the pleura, or membrane lining the chest and lungs; which has shewn itself by the common appearances before and after death. These cases, like the former, have been so rare, that I did not think it worth while, in the view of profit, to employ remedies; and my avocations would not permit me to enter into any process of attendance.

I have already spoken of a disease much noticed by the French, and called by them la Tournie, le Lourd, &c. It is the same as that which we term Foolishness,

the Gid, or Giddiness; and principally affects these animals from 1 to 2 years of age. They turn their heads on one side, or upwards, and cannot accurately move their muscles according to the direction of the will. Hence they stagger in walking, and often beat themselves against any object at which they aim, or which intervenes between them and that which they mean to approach. By degrees these symptoms increase, till, at length, they frequently fall. They run into corners from the rest of the flock, become unable to crop or chew their food; and, at last, at the end of several months, die in a state of great emaciation. The cause of this disease has been found, on dissection, to be pressure on the brain from water, either in the natural cavities, or, as it is said, contained in a cyst or bag.* During the last 5 or 6 years, I have in this way lost about 4 sheep, and have now a ram hog labouring under it. It is, therefore, a rare disease in this breed, but, so far as I know, absolutely incurable.

That which is more common, and very difficult to eradicate, when it once gets into a flock, is the Shab, or Scab. It is much spoken of under the name of Scabies by the Romans, whose flocks seemed very subject to it; and by the French, who call it la Gale, or the itch, and with whom, as in Spain, gross neglect often makes it fatal. It is extremely infectious; and as, when it has once affected the skin, or wool, it will lie a long while dormant, I think it probable that it never arises from any other cause. Some years ago I discovered it within 2 days of their arrival in some ewes which were sent to one of my rams; but as I had before found it very easy to cure in some Ryeland sheep, I thought it worthy of little notice. A few months, however, convinced me of my error. A large proportion of my ewes and lambs was infected, and more than 2 years elapsed before I could root it out of my flock. It produced a deficiency of nearly half a pound of wool per fleece, throughout the whole of my infected sheep. I am persuaded that, from the peculiar nature of the wool and skin in the Merino, and its finer crosses, it is in them more difficult of cure than in the coarser and more thinly covered skin of the native English breeds. It may, however, be certainly removed, by long perseverance in the due means; and as certainly prevented by sufficient care in avoiding all communication with

* Partly from other occupations, and partly from neglect of notice by my servants, I have omitted to open the heads of any of these sheep; but I shall endeavour to avail myself of future opportunities of this kind. It is not impossible that the disorder may be found owing to hydatids, like those in the lungs before described.

animals already infected, and by other measures, all of which I shall specify in their proper place.

There is another troublesome malady, with which my Merino Ryeland flock has been twice affected, and which, not being even mentioned by the French writers, can, I think, scarcely exist in the Merino breed in Spain or France. This is the Foot-rot; a complaint too well known to require a description. It is chiefly inconvenient, as it indisposes the animal to move about in quest of food, and therefore makes him thinner in flesh and wool. Farmers generally consider it as infectious. It began to shew itself in my flock soon after they had been crossed with certain pure Merinos, which came to me labouring under this disease. They were all cured, and remained for several years free. Afterwards I obtained another Merino ram, who proved to be lame of it in all his feet. Very shortly after, my flock began again to suffer; and though individuals were readily cured, others continued falling down, from time to time, for several years. In 1804, 14 out of 43 lambs, though lying on dry ploughed ground, were seized with the disease in less than a fortnight. I separated them from the rest. In 2 days, 3 more were affected. I immediately removed these; and no more became ill. These facts lead to a suspicion that the disease, when once produced, is actually contagious. It is certain, however, that damp land, a rainy season, and deep grass, dispose to it, if they do not actually produce it; and that it seldom appears in sheep feeding on dry downs, or in fallow fields. In individuals it is easily and quickly curable; and when, at the same time, it becomes general, or lasts long, throughout a flock, or is violent in any particular sheep, the shepherd is justly chargeable with very culpable negligence, or ignorance.

The sheep and lambs of my breed, like those of others, are sometimes affected with looseness, or scouring, which most frequently occurs in the spring from new grass. I have found it never fatal, and easily cured.

I hear and read of great mortality among sheep after shearing. In my own flock, I do not recollect ever having lost a single sheep, or lamb, from that operation.

The lambs of my breed come into the world very bare of wool; and, therefore, certainly require more shelter than those of most other kinds. The same is probably true with regard to all the deep crosses from the Merino race, as well as to those of the unmixed breed. With due care, however, which I shall hereafter specify, I have not lost more than 4 or 5 per 100 in the produce of ewes from 2-tooth to decrepitude.

Upon the whole, though the Merino-Ryeland breed of sheep is not quite so hardy as some others, yet, under that attention which it well repays, it is full as exempt from disease as any of our indigenous breeds.

CHAPTER IV.

Obstacles to the Extension of this Breed. Want of a ready sale for the Wool, at its acknowledged Value in the Manufacture. Various Objections stated. Reasons for the Extension of the Breed. Ignorance of the Wool-stapler as to Wool in the full Yolk. Proposition to extend the Sale, by reducing it to the Spanish State, and by other Means.

THE account which I have given of the different qualities of this race of sheep seems sufficiently flattering to lead to a ready and wide extension. In this respect, however, many difficulties and objections occur, which I will now consider.

I am sorry to observe that the chief obstacle arises from the backwardness of the manufacturer to give the proper price for the wool; an evil which the late noble President long ago saw, and justly deplored; and which, to this day, is felt, not only by the common growers of such wool, but in the Royal flock itself. It is acknowledged that the wool of this flock is better than that of the Negrette pile in Spain; yet the Refina, in the year 1802, sold only for 5s. 9d. per lb. clean scoured, while no manufacturer would, at that time, have hesitated to give 7s. 3d. per lb. for Negrette in the same state.

In order to justify this objection, various shallow pretexts are advanced. One person (the representative of a large class of mankind judging from equal premises) speaking to a friend of mine of my wool, which he had never seen, put his hand on a fleece of South Down wool, and pronounced that it was finer than mine. Another feels my wool, and gravely declares that it is not *broad* enough; that is, in fact, that it is too soft and fine. Should I satify this gentleman by *meliorating* it with a cross of the broader Leicester? A third person minutely examines the scoured wool of the whole fleece of one of my rams, by the side of scoured specimens of the most noted Spanish piles; and though officially appointed to give a comparative judgment as to their merits, so far as it could be given from such an examination, absolutely refuses to advance any opinion at all, and quashes the very inquiry for

which he was constituted. How loud and eloquent is this determined silence!— A fourth person, a dealer in wool, after having looked at my wool in the yolk, declared, in my absence, to a friend, that he would not give a shilling a pound for it. This wool was afterwards, in the same state, sold for between 2 and 3 shillings. Ignorance is always an evil; but it can never be a crime, except when it is wilful.

There is still another objection, peculiar indeed as to its nature, but, no doubt, considered by those who advance it, as formidable, and indeed unanswerable. "It "is true," say they, "you can produce a few pounds, or a few packs of fine wool; "but what are these, comparatively with the demands of the trade?" One has often heard of prophets who accomplish their own predictions. Let the clothier only offer for our wool the same price which he freely gives for Spanish or German of the same quality, and, in due time, we will engage to supply him with all which the trade requires.

These are silly and superficial objections. Manufacturers, anxious to preserve the excellence and established reputation of their fabrics, cannot be blamed for doubt and caution in the admission of a new material. But when the value of this material becomes generally known, so that the greatest encouragers of the breed are now actually clothiers, some of whom profess a determination to keep from 3 to 20 thousand of these sheep, and when some of its chief opposers are men, who, at a great price, and on mere report, have bought German wool, and now constantly use it in their manufactures, it may shrewdly be suspected that the true grounds of objection lie much deeper than they would have us believe.

Spanish wool has, of late, reached an enormous price. This has been owing to various causes connected with the war. The French have certainly taken great pains to monopolize its sale; and it has been asserted by the acute and nervous writer of a weekly political journal, that every pound of wool exported from Spain to Great Britain pays a tax to the government of France. Thus are our manufactures converted to the support of our most inveterate foes. Spain itself is absolutely dependent on France; and it is worthy of the morals and policy of Napoleon to foment divisions in that nation, as a pretext for his interference, and the virtual annexation of its government to his own. Thus we must depend for the basis of our most important manufacture on the will of a Sovereign, who has shewn us that he will not, even during peace, receive a single article of our fabrics. How far the exportation of the raw material itself is likely to be permitted, except

on terms which must raise the price of our woollen goods beyond all profitable bounds, I leave those to judge, who have observed the spirit of the French Emperor, and his own declarations of his eagerness to establish manufactures and commerce throughout his extensive and populous dominions.

There is another point which ought here to be mentioned. Bourgoing has taken great pains to shew that the travelling sheep are destructive of the produce and population of the finest provinces of Spain; and he contends, that nothing would so much contribute to the welfare of that country, as the inclosure of these provinces, and the consequent annihilation, or reduction, of those immense flocks. Such a step would, probably, soon follow any revolution in the Spanish government.

In the mean while, should none of these events take place, we cannot but know, that for several years past, we have been annually paying for fine wool, to a country which will not by treaty take any of our goods, more than 15 hundred thousand pounds sterling; and the clothiers complain that its price is now so greatly advanced, that it is scarcely worth their while to continue the trade. Spanish wool, of the best quality, is certainly increased at least 3s. per lb.; and 2 lbs. of imported wool are necessary to make a yard of broad-cloth. If then, to these 6s. per yard, be added the great augmentation of wages, and of the price of dying materials, soap, candles, oil, coals, and almost every article which is employed in the manufacture, we shall readily allow that the addition of 4 or 5 shillings per yard to the retail price of the cloth, can go but a small way in compensating the manufacturer for all these enormous advances.

What then can lead him to discourage the introduction of a new and additional supply of so precarious a commodity, on the existence of which depends his very subsistence? I fear it will be found that this conduct originates in a spirit of monopoly; or in a little, lazy, narrow policy, which fears to hazard shillings, in order to secure pounds. The importation of Spanish wool is in few hands. We know that vast stocks of that important article have been accumulated, a price set upon it at discretion, and great profits made from its sale. Several clothiers are partners in these commercial houses. Many others are actually supported by them on long credit; just as publicans are often furnished and maintained by the great brewers. The importer has in his hands all the bullion from which is coined the whole circulating and perishable commodity; and the

little clothier derives his bread from the profit of the coinage. It is not to be wondered at, therefore, if the former dreads the discovery of any new mines, and if the latter, afraid of trusting to what he at present considers as an inadequate and merely casual supply, and at the same time apprehensive of offending his patron, will not receive it at all, or will receive it only by stealth.

These, I think, are the true and chief grounds of objection to the free and unrestrained purchase of our native fine wools. But, under this deserved imputation, I am far from classing the majority of persons in every department of the trade, many of whom are men of free minds, discerning, candid, and patriotic; whom I am proud to rank among the most valued of my friends, and to whose liberal communications I am indebted for almost every thing which I know on this part of the subject. But the generality of mankind must necessarily be influenced by report, rather than by direct experience. The cry of detraction is more impressive than the "still small voice" of truth; and a child may ignorantly or mischievously kindle a flame, which the efforts of a hundred men shall not be able to extinguish.

I have observed above, that the dealer in wool is utterly ignorant of its value in the yolk. This may be considered as an equitable objection to its sale; and it can hardly be expected that an inexperienced person should take so important a matter upon trust. To remedy this evil, I know of only one expedient; which is to reduce the wool to the Spanish state of cleanness. Then no difficulty, and therefore no just ground of cavil, can any longer exist on the part of the buyer, and the value of the wool will readily appear from a comparison with Spanish of the same quality.—Of the necessary operation of washing, I shall, therefore, speak more largely hereafter.

This mode being adopted, and the knowledge of the value being properly diffused among the manufacturers, I have no doubt that we shall find them, with a few exceptions, disposed to give a just price for any fine British wools, which might be offered to them.

This end might be further answered, if gentlemen of rank and fortune would follow the patriotic example of Lord Somerville, and give some preference to cloths made of wool of our own growth. Inquiries for such cloths would naturally cause the draper to demand them of the manufacturer.

I once thought that the establishment of central markets, as at Bath for the West of England, might afford an opportunity for fair competition among the buyers of

fine British wool. But various subsequent circumstances have led me to apprehend that this method would be unsuccessful. The Gallo-Merino breeders were offered less for their wool, at the public sale of Rambouillet, than by private dealers.

Should these measures still prove ineffectual for securing the full value of the wool, I know of only one farther method; which is to employ one manufacturer, selected by the growers, to make up for the market all the British fine wool which should be sent to him, at a certain rate, and with an accurate return of particulars. No difficulty would then arise but as to the vender, who might either be chosen, or, in case of unexpected objections from established houses, set up and supported for this very purpose, and who would, no doubt, be warmly patronized by a liberal and patriotic public. Offers of this kind have already been made by manufacturers; and, were it necessary to accept them, the whole plan might readily be carried into effect by a proper union of the growers.

The chief difficulty which stands in the way of the farmer being thus removed, the demand for the wool would soon increase these breeds to a great extent; and thus, eventually, give the clothier an opportunity of purchasing the raw material of the manufacture at a much less price than he now pays. No man can fail duly to appreciate such a benefit to the clothier, and the general commercial interests of the country.

CHAPTER V.

Profit of this Breed to the Farmer, and the Country at large, comparatively with other Breeds, in relation to Quantity and Price of its Produce per Acre. Various Objections considered.

Let us now consider what profit the farmer may reasonably expect from this breed of sheep, comparatively with others of the short woolled kind.

In my former publication, it is made probable that there are, in Great Britain, 3,500,000 acres of land, incapable of any improvement by the plough, which, at present, make no return but by the wool of the sheep which they support. As the greatest part of this land is extremely poor, and incapable of sustaining sheep during the winter, a proportionable deduction must be made from its efficiency; or, in other words, a larger extent of it must be supposed necessary for the maintenance of each sheep during the whole year. Making this allowance, I have estimated one

sheep as the stock of $2\frac{1}{2}$ acres. Now as the sheep kept on this land are usually of a small kind, bearing coarse wool, we cannot reckon the washed fleece at more than $1\frac{1}{2}$ lbs. in weight, at 1*s.* per pound; or $7\frac{1}{5}d.$ the acre annually. On the other hand a Merino-Ryeland, on such land, will give 4 lb. of wool in the yolk; worth, as above stated, 15*s.* or 6*s.* per acre. In this comparison, every thing relative to fatting is totally out of the question; and, as it may be fairly presumed that the growth of the two animals cannot be very dissimilar, the return from the Merino-Ryeland breed, on this land, will be almost 10 times as great as from the sheep with which they are usually depastured. If we apply the same reasoning to better land, as of 15*s.* per acre, the result will still be highly favourable. It cannot be unreasonable to suppose, that if 3 South Downs can be kept on an acre of such land, so also may 3 Merino-Ryelands. The wool produce of the latter, in this instance, will be full 15 lb.; which, at 3*s.* 9*d.* per lb., as above, will make 56*s.* 3*d.*; a return, which, I presume, is greater in proportion to the rack rent, than that of any other breed of sheep, wool and carcase taken together, in this island. On the other hand, the wool produce of 3 South Downs will not exceed, when washed, 10 lb. at 2s. 2d. per lb. or 21s. 8d.; leaving a difference in favour of the former, from the wool only, of 34s. 7d. per acre. Against this superiority in point of wool nothing can be advanced on the side of the South Downs, but an equal superiority in respect of carcase. In order to effect this, the South Downs must, during the same time, put on as much more flesh than the Merino-Ryelands, as, at 8d. per lb. shall weigh 51 lb. 14 oz. or 17 lb. $4\frac{3}{4}$ oz. each. No one, who has seen the progress of the two breeds, will, for a moment, admit this difference of fattening in favour of the latter.

In this last calculation, the comparison is made as on three animals of the same weight, living on the same quantity of food. But my wool estimate of the South Down is taken from an animal weighing, according to Mr. Young, from 120 to 125 lb. whereas no Merino-Ryeland ewe of my breed has exceeded 85 or 90 lb. of live weight. Now as the latter is capable of living at least as hardly as the former, we might allow one sheep more to the acre. This will appear when we consider that $120 \times 3 = 90 \times 4$. Let us, however, allow only half a sheep per acre of the Merino-Ryeland more than of the South Down, and this will increase the wool produce of my sheep per acre to 65s. $7\frac{1}{2}$d, leaving a difference of 43s. $11\frac{1}{2}$d. in

favour of my breed; which requires, in order to compensate it, a superiority in mutton of nearly 63 lb. per acre.

The same comparative superiority would take place on land of two or three pounds an acre; on which, if the sheep were thickly placed, the wool would be of the finest possible quality; or, if more sparingly, so as to become fat, the increase of weight in the fleece would make full amends for some diminution of fineness in the filament.

The actual return of a farm of any kind, stocked wish this breed of sheep, has not yet been accurately ascertained; nor can it be, till such a farm be fully supplied with sheep all yielding the best fleeces, and till a ready sale for the wool be established. I have already stated the variety of sheep which are on my own farm, in point of breed, proximity to the Merino, age, and other circumstances; as well as the various methods in which I have applied my wool, and sheep. I think, however, that 450 sheep, and 195 lambs, together with from 6 to 7 of the larger animals already mentioned, supported on the land and food which I have described, are, all circumstances considered, a pretty large stock. Notwithstanding which, my sheep are in good condition, and the hay, cabbages, rape, rouen, potatoes, and other articles which still remain, will be fully sufficient to maintain them till there is plenty of grass. Three or four years hence, if an opportunity be granted me, it is probable that I may make to the public an accurate statement of the annual produce and consumption.

On the farm of Lord Somerville, the report of which is given in the 10th volume of the Bath Society, there was a similar mixture of stock, causing much difficulty as to the actual conclusion relative to the produce of the fine-woolled sheep; yet, in the same volume, I have endeavoured to shew that the return for all the kinds of wool taken together, was about £3. per acre; and, inclusively of carcase, £5. 18s. per acre. This was independent of letting of rams, which, in the same year, amounted to £524. 10s.; and of any sale of the sheep which bore the finest wool. The land was valued at 36s. the acre, and was, in extent, 166 acres; of which between 20 and 30 were in turnips.

Notwithstanding a conclusion so favourable to farmers, objections spring up with them, like weeds in their own neglected fallows. One person asks me whether this breed is fit for deep soils; and another, whether it will bear folding; as if

all the land in this island stood in the meadows of Romney Marsh, or on the hills of Wiltshire. Providence has liberally supplied us with a variety of soils and situations, and has left it to the experience of man to assign to each its proper inhabitants. Deep soils I have had no opportunity of trying; and those which are moist, are certainly not fit for any breeding or stock sheep; but from the success of the pure Merino flocks at Rambouillet and in Holland, I should have little doubt that they might do tolerably well, though, probably, not so well as some other breeds, on account of a somewhat greater propensity to the foot rot. I have often folded them in the summer and autumn on arable land, and summer and winter on dry pastures, without the smallest injury; but I do not think that they will bear winter folding on heavy soils, and in exposed situations.* Neither would this practice suit them on account of the quality of their wool, and the great quantity of it which is spread over their bellies and legs. Every thing in nature has its appropriate purposes; and he, who should regret that one object is inapplicable to all, might with equal reason complain that he cannot roast his dinner at a candle, or mow his fields with a razor.

Exercise, no sheep can sustain in a superior, perhaps equal degree. I have described the long and habitual journies of the pure Merino; and Lord Somerville has sufficiently proved the same to be true with the Merino-Ryeland; of which 5 wethers, exhibited at his late noble shew of cattle, at Barbican, had travelled fat, without injury, 160 miles.

Much apprehension is expressed by clothiers, and those concerned in the manufacture of combing wool, lest the introduction of these breeds should expel those of our native kinds, which have already been found so valuable for their particular purposes. To this argument I might answer in general terms, that we might just as well reprobate the encouragement which is given to the extension of the best rams, lest they should annihilate neat cattle; and the introduction of potatoes, lest they should exterminate wheat. There is no test of the value of any thing but its demand, and, consequently, its price. The farmer will, doubtless, prefer those objects which make him the greatest return, in a given time, for the capital and labour which he employs, whether that return arise from potatoes in preference

* Who is there, in fact, whether in Wiltshire, or elsewhere, who shall presume to decide, that folding is not a poor and destructive expedient on all lands which are accessible to a cart or a horse?

to wheat, or from the wool and carcase of the Merino-Ryeland sheep, comparatively with the South Down, New Leicester, or Lincoln breeds; and he will justly infer, that, as long as that superiority of profit continues, the object which he cultivates is found to be of superior value by those who use it. As the balance in his favour diminishes, he will begin to doubt; but it will not be till the continuance of comparative depreciation is become highly probable, that he will think it necessary to change his object for a new one. In the present case, such a change must be very gradual. One breed of sheep cannot be substituted for another, as a man changes barley for oats; and every man will have full time, as the nature of the case may dictate, to make such substitutions as shall be suggested by his fancy or his prudence.

In the mean while, I have already expressed my opinion that the Merino breed and its crosses are least adapted to that species of land which usually supports the races of our truly valuable long-woolled sheep.

As to the apprehension respecting the expulsion of our native short-woolled breeds, without offence be it spoken, I see nothing in it which greatly afflicts me. It is said, that, for our finer fabrics, we can get abundance of suitable wool from foreign countries; while for various other purposes the coarser wools are necessary, and cannot be any where obtained in equal perfection to that which is produced on our own soil.

I deny the general truth of both these positions. Short coarse wool may possibly be best for saddles, matresses, cushions, chairs, and sofas; and, as far as I recollect, for no other extensive purposes whatever. Even for most of these, horse-hair is much preferable. For the lists of broad cloths fine wool is certainly a great deal better; not only because the coarse, shrinking unequally with the finer which it borders, injures the edges of the cloth, but because $2\frac{1}{2}$ lb. of the latter will serve instead of $4\frac{1}{2}$ or 5 lb. of the former. That blankets would be best fabricated from superfine wool is evident from the softness, lightness, warmth, and beauty of those expensive ones of a fawn colour, which are often brought into England from India. The same sort of wool would also be most profitably employed for every species of cloathing, whether for the rich or poor. A very intelligent manufacturer, the late Mr. Wansey, of Warminster, informed me that his father was formerly accustomed to make, for the East India Company, a species of cloth called Elephant. Whether it was intended for the covering of that animal, whose name it bore, I have not learnt;

but it was a thick cloth, made of the finest Spanish wool; and old Mr. Wansey, while walking about and smoaking among his spinners, used to complain that their yarn was not coarse enough, and pointed to his pipe as an example of the proper thickness. Every manufacturer knows that excellent mops are made of fine yarn; and what are called the flocks of superfine cloths make beds of a more moderate and uniform degree of softness, and more wholesome to those who use them, than the best feathers.

In a word, were there a sufficient quantity of superfine wool properly applied, I firmly believe that the breeds of coarser short-woolled sheep, so far as respected their fleeces, would be unnecessary; and that nearly all the wool, which was needful for the meaner purposes, would be furnished by the tails of the Merino, and the shorter parts of the fleece of the long-woolled kinds.

Neither is it true that the production of this sort of wool is exclusively confined to Great Britain. There is no country in Europe which does not produce it in great abundance; and, in the paper alluded to at the beginning of this work, it is stated to Parliament, that, in the 3 years ending 1804, at least 3,000,000lbs. or 12,500 packs of coarse wool were actually imported into Great Britain, for the use of its manufactures.

Let us consider in other points of view the substitution of the Merino and its crosses. I have already observed, that a given weight of the coarser wools will make less superfine cloth than of the finer; whether the same thing be true as to coarser cloth, which is more open and porous, I am unable to determine.

The two breeds of native English sheep, which produce the greatest quantity of carding wool, relatively to the weight of carcase, are the Ryeland and South Down. Let us compare them in this respect with the Merino-Ryeland, assuming, what I believe is perfectly fair, that in clean scouring and picking these different kinds of wool, the last loses $\frac{1}{2}$ from the full yolk, and the two first $\frac{1}{5}$ each from that state to which they are reduced by clean washing in the usual way on the sheep's back.

				lb.	oz.	dr.
South Down ewe carcase,	125 lb.	Washed wool,	3 lb. clean scoured,	2	6	$3\frac{1}{5}$
Ryeland, - -	75 lb.	Do.	$1\frac{3}{4}$ lb. do. -	1	8	$3\frac{1}{5}$
Merino Ryeland -	75 lb.	In the yolk,	$4\frac{1}{2}$ lb. do. -	2	4	0

This is the gross result; but in order to make the comparison fairly, the weight

of the carcases should, in each case, be brought to one standard, and the wool estimated proportionably to that weight.

In this case, on 125 lb. of carcase we shall have,

	lb.	oz.	dr.
South Down as before, - - - - -	2	6	$3\frac{1}{5}$
Ryeland, - - - - - -	2	5	$2\frac{2}{5}$
Merino-Ryeland - - - - -	3	12	0

Hence it appears, that on 125 lb. of living carcase, the Merino-Ryeland carries 1 lb. 5 oz. $4\frac{2}{5}$ dr. of scoured wool more than the South Down, and 1 lb. 6 oz. $5\frac{2}{5}$ dr. more than the Ryeland. This superiority of wool produce in the Merino-Ryeland on 125 lb. weight of carcase, must appear to every person, who calmly reflects on it, a matter of the highest importance.

In the beginning of this Essay I have stated that about 6,500,000 lbs. of fine wool of commerce are of late annually imported into Great Britain from various other countries. This wool, by clean scouring, loses, through all its sorts, about $\frac{1}{5}$ of its weight; and, therefore, becomes 5,200,000 lbs.

The 3,500,000 acres of unimprovable land, which I have above quoted, are supposed to carry not more than one sheep to $2\frac{1}{2}$ acres. These sheep being generally of a small kind, cannot yield, one with another, more than $1\frac{1}{4}$ lb. of clean scoured wool. The produce of 1,400,000 such sheep will, therefore, be 1,750,000 lbs. On the same land, the Merino-Ryeland, at 4 lb. per fleece in the yolk, would give 2,800,000 lb. of clean wool, of the best quality. At the present prices, the former at 2s. 2d. per lb. through the entire fleece, could not be worth more than £189,583. while the latter, at 7s. 6d. per lb. as above, would pay £1,050,000.; making, in favour of the Merino-Ryeland wool, a difference of £860,417. which, alone, is nearly 5 times the value of the present produce.

According to an ingenious author, Mr. Luccock, who has collected a great mass of entertaining and useful information on the subject of sheep and wool, 28,412,202 acres in England and Wales carry 14,854,299 short-woolled sheep, yielding 202,737 packs of wool at 240 lbs. per pack, or 48,656,880 lbs. Nearly all this wool is washed on the sheep's back, and, on being farther scoured, suffers a reduction of at least $\frac{1}{5}$ through the whole fleece.

Now, as I have observed above, the waste lands being capable of producing 2,800,000 lb. of clean scoured superfine wool, a deficiency of 2,400,000 lbs.

remains in the quantity of such wool imported. This deficiency would be supplied by 1,200,000 sheep of the Merino-Ryeland breed, substituted for an equal weight of the coarser-woolled ones now existing; and if we suppose that the carcase of the former is only $\frac{3}{5}$ of the weight of the present breeds, then the number of sheep which would require to be expelled, would be only 720,000. These sheep giving, according to Mr. Luccock, $3\frac{1}{4}$ lb. of washed wool each, reducible one-fifth by clean scouring, will produce 1,872,000 lbs.; which, added to 1,750,000 lbs. on the waste lands, will amount to 3,622,000 lbs. of coarse woo clean, or 4,346,400 lbs. washed on the sheep; which makes less than one-eleventh of the whole produce, taken out of the market, in order to admit 5,200,000 lbs. of superfine, carried on an equal weight of carcase.

I have already shewn that these 5,200,000 lbs. cost Great Britain, annually, about £1,560,000.; and if we reckon the produce of the native clean wool at 2s. 6d. per lb. * that will give £452,750.; leaving in our favour, by such a substitution, a balance of £1,107,250. per annum. How far this substitution, under all the circumstances, would be beneficial to this country, let the reader determine.

All the comparisons which I have hitherto made, lie between sheep bearing short carding wool. It is in this respect, that, in my judgment, they ought chiefly to be made; because the long wool of this island is its peculiar treasure, indispensable to its manufactures, unrivalled, probably, by that of other European countries, and best grown on rich and deep land. Let us, however, for the sake of curiosity, compare the wool produce of my breed with that of some of the long-woolled tribe. From the Annals of Agriculture, vol. xxii. p. 391, et sequent. it appears that an acre of Romney Marsh land supports, at shearing time, a full average of four sheep. Now we are told that, "the principal part of the soil," on which these sheep are kept, is "a fine soft loam, with a mixture of sea sand; and having lain, time out of mind, "in grass, covered with sheep, both winter and summer, its turf is wonderfully "thick and fine; and the grass it produces is of a fattening quality, equal, if not "superior, to any in the kingdom." We find, also, that the sheep when fat, at two-shear, reach 24 lb. per quarter, and that the wool produce is estimated at 20lb. per acre. These 20 lb., when scoured, would be reduced to $16\frac{1}{2}$ lb. Now when

* Which, value and weight of fleeces of all the English short-woolled breeds considered, is from $\frac{1}{5}$ to $\frac{1}{4}$ too great an allowance of price.

we consider that the average weight of my sheep, at the same age, does not exceed half that of the breed in question, and reflect on the number which I am able to keep per acre on the poor land of my farm, I think no one will doubt, that, at shearing time, which is certainly the most productive in nutritious pasture of any season throughout the whole year, an acre of Romney marsh would readily support from 8 to 10 of my breed. If we allow only 8, at 5lb. per fleece each, or 20lb. of clean scoured wool, the difference of produce will be 3½ lb. per acre in favour of the Merino-Ryeland breed over the long-woolled race of Romney Marsh.

The superiority would, probably, be to the full as great, on the same pasture, over the Cotswold, Lincoln, or New-Leicester breeds.

Were abundance of the finest wool produced in these islands, there can be little doubt that new fabrics, now absolutely unthought of, would be discovered amongst us. I have already mentioned that the French have found no material loss of weight in wool of the Merino breed suffered to remain 2 and even 3 years on the same animal; and that I have had a similar result as to the wool of a Merino-Ryeland ram. Such wool would be of inferior value to clothiers; but the ingenuity of Mr. Charles Pictet, and his lady, has applied these materials, by themselves, to the manufacture of shawls, which, according to his own description, as well as that of Mr. Poole, who has seen them, are superior in softness, lightness, and beauty, to any produced in Norwich, or other parts of England. Having enquired of a very ingenious friend, connected with the Norwich trade, as to the practicability of employing my fine long wool in that way, I found that I was anticipated in this application by Mr. Tollet, whose wool was actually in preparation for such an experiment. Since that time, I learn that a shawl has been finished, but that, from having been woven too thick, it has disappointed the expectations which were formed of it. It is probable, also, that being wool of the 1st cross of the Ryeland with the Merino, the filament was too coarse for any very flattering result. My fleece, beforementioned, which is 6 inches in length, and of the finest filament, is ready for trial by any manufacturer of shawls, who will apply for it.

Having thus largely considered the comparative value of the Merino-Ryeland breed of sheep to the farmer, the clothier, and the kingdom, and thus offered the most powerful motives for the extension of this and similar breeds, I must now advert to a very important part of the subject, which is their management.

CHAPTER VI.

Management of Merino-Ryeland Sheep. Age and Season of Propagation. Modes of admitting the Ram. Expediency of Housing the Ewes and Lambs. Methods of effecting this Purpose. Quality and Quantity of Food: Hay; Linseed; Oil-cake; Grains; Rouen; Turnips; Cabbage; drumhead, for Spring and Winter; Mode of Cultivation; early York and Battersea Cabbage for summer Food; Rape; Carrots; Potatoes; Succory; Winter and Spring Vetches; Salt.

THE first object of inquiry which presents itself, is the proper age and season of propagation. Those who have the care of the Merino flock of Rambouillet, lay it down as a principle, that, in order to insure the due growth of the progeny, and an exuberant crop of wool, no sheep should be permitted to generate till $2\frac{1}{2}$ years old; at which period they consider the growth of the animal as nearly completed. This principle has been applied to rams as well as ewes, and seems to be justified by the success of that flock, which in size of carcase, and weight of fleece, appears greatly to exceed any other of the same breed in the world. This practice is often followed with regard to the ewes in many of our native varieties in England. On the contrary, M. C. Pictet, and some other writers, contend that this is a mere refinement of luxury, occasioning great loss of time in multiplying the species, and being contrary to the instincts of nature, which are infallible. In point of retardation, the charge may have some truth; but the second position appears to me not conformable to experience, and therefore false. In a state of nature, much of animal as well as of vegetable life is abortive and lost; but the Creator of the universe, who placed us at the head of this world, and, at various times, has breathed into us a portion of his spirit, made us his instruments for the general good. We are, therefore, required to apply his laws, so far as he hath permitted us to see them, to the perfection and happiness of all the beings which it hath pleased him to subject to our controul. In the human race we find that the sexual appetite precedes the capacity of propagation; and that too early connection not only produces degenerate

offspring, but, in the parents of both sexes, premature weakness and decay. Among the lower animals, I have known a heifer under a year old pine away and die, in which dissection pointed out no cause of death, but that she was already two months in calf. In sheep themselves, we find that shearling ewes generally bring smaller lambs, and much more frequently lose their produce in yeaning, or from want of milk, than older sheep. At the same time, either from gestation or suckling, their own frame never afterwards attains its full growth, and the wool is either absolutely, or relatively, less than it would otherwise have been. These circumstances prove, that, with a view to immediate interest, if not to the ultimate well-being of the race itself, we ought to restrain the ewes from too early connection. How far the interest of the owner may cause an exception to this principle on some particular occasions, is another question. It is, doubtless, often desirable for him to increase his flock at all hazards; and, thus circumstanced, I have often admitted my yearling ewes to the ram, and am now observing the difference of results, though I have not yet had time, from my own experience, fully to establish it.

Should the latter mode be preferred, it is certain that much advantage will arise from plenty of wholesome food, continued from the very birth of the lamb, all through the periods of conception, gestation, and suckling.

Experience shews that the same antecedence of desire to capacity takes place in the male in a greater degree than in the female; and if the effect is not so obvious on the offspring, it is sufficiently clear with regard to the animal himself, who, from the peculiar circumstances of his bodily constitution, is more weakened and exhausted, and often dies. There may, nevertheless, be occasions on which it may be convenient to have the early use of the ram as well as of the ewes. Thus, for example, when a shearling is much superior in all valuable qualifications to any of the older stock, in such a case one would rather incur some risk of injury to him, than entail on a whole generation the certain defect, which would follow the want of his services. So circumstanced, we should spare his strength by proportioning the number of the ewes, of which we should, most prudently, choose a few best calculated to perpetuate his excellencies; and both before and after the period of service, we should take care to supply him with plenty of the best food. When, however, we are anxious for the excellence of our whole flock, and have our choice of rams, it is best to defer propagation, in both sexes, till they are from two to three years old.

There is not less difference of opinion as to the season and manner of putting the ram to the ewes. In England, these points are regulated chiefly by two considerations, the first of which is food.

The smaller breeds of sheep are usually fed on hills and dry lands, on which the spring of grass is late. If, therefore, the owner have no warm and sheltered inclosures, or water-meadows, he contrives that the ewes shall not lamb sooner than from the middle of March to the middle of April. On the other hand, the proprietors of several of the larger breeds, as the Dorset, are interested in early yeaning, either for house or grass lambs; and for the latter they have either meadows, or other appropriate food. It is found, also, that, in unsheltered situations, the lambs suffer much from cold, as well as want of nourishment; in which case, they are stinted in their growth, and never, afterwards, reach their due size and proportions.

It seems as if there were, in different breeds, a natural variation in the period of heat; for I remarked, last summer, that 47 of my Merino-Ryeland ewes became blythsome, (or, according to the common phrase in this country, were blissoming) much sooner than 60 ewes of like age, which were either pure Ryelands, or had a cross of the Leicester. These two lots were afterwards, on the 13th of September, put to two different shearling rams, apparently equal in size and vigour, and were depastured on two pieces of similar land nearly adjoining. They were also alike in health and flesh; notwithstanding which, it appeared from the lambing, that of the 47, 31 were effectually impregnated in the first 7 days, 14 more in the next 7, and the 2 others in 2 days afterwards; and of the 60 Leicester-Ryelands, 8 only were impregnated in the first 7 days, 27 or 28 in the next 7, 3 in the third 7, 14 in the fourth 7, and not all till 50 days from the commencement.

In the same breed much difference will also arise from the degree of feeding. My flock last season being considerably better in flesh than in former years, acquired their heat several weeks sooner; and 3 of my 2-tooths brought forth lambs from the 8th to the 11th of December; and, therefore, must have received the ram by stealth, from the 11th to the 14th of July.

Though our farmers have chiefly attended to the circumstances of warmth and plenty of food for their lambs, as indicative of the prudent season of impregnation, they are not ignorant of one fact, which seems to have a leaning on some other cause. They generally observe that lambs which fall at the latter end of May, or

in June, notwithstanding the warmth of the season, and the abundance of the best grass and other food, remain of a diminutive size, and are weak and mishapen, in comparison with those which are yeaned at an earlier period. Even this fact, however, is indecisive, because these Cuckoo lambs, as they are called, may have been produced from ewes which did not sooner take the ram, on account of infirmity, or extreme youth.

The French writers explain the matter another way, contending, that, as in the case of age, the natural instinct should be obeyed, and the ewes indulged in their first heats, which are not equalled in force by any of those which follow, every 9 or 10 days, for some weeks afterwards. Accordingly, they say, if these early impulses are neglected, the ewes more frequently turn, as it is called, or fail to conceive after copulation; and many eventually remain barren.

This fact has, I think, been, in some degree, proved by my experience of the last season. I have mentioned above, that 47 of my ewes were impregnated from the 13th to the 29th of September, by one ram. An accident prevented my admitting 37 other ewes to another ram till the 7th of October. These ewes were, in every respect, similar to the former; and, in the course of a few days, my shepherd saw half of them served. On the 16th of October, the ram was observed to be ill, and the next day died. These ewes had been seen to be blythsome several times before the admission of the ram, and not one of them proved to be impregnated. When they afterwards conceived by another ram, their lambs were comparatively small and feeble.

It may be added, in confirmation of this principle, that the three 2-tooth ewes before-mentioned, and which were impregnated very early in the year, notwithstanding their extreme youth, brought forth fine lambs.

From all these circumstances taken together, I think it best, as far as can in any degree suit our convenience, to take advantage of an early impulse in the females, in point of season.

This end may be obtained in two methods; the first of which is to let the ram remain the whole summer with the ewes; and the second to keep them separate till the middle or latter end of the summer, when the natural propensity in the females first commences. Each method has its conveniences and inconveniences.

In the first, the ewes proving blythsome in slow succession, the ram is less fatigued, and is, therefore, fit for a greater number; and a full grown healthy ram

may, without injury to himself, serve 120 ewes, or more. But then the lambs will drop in the same succession; and the shepherd will be harassed by a constant and necessary, though often ineffectual attendance, during the cold and dreary nights of the whole winter. The lambs, also, will not only, on account of their disparity of size and strength, make an unsightly appearance, but, as they grow up, the stronger will chase from their food and otherwise oppress the weaker; and thus a large proportion of the flock will be greatly injured.

On the other hand, when the ram is at once put to the ewes in full season, he will be fatigued and exhausted by too numerous exertions; for which reason 60 ewes are all which ought to be allotted to a full-grown ram, and 40 to a shearling. In this manner the early instinct of the ewes may be accommodated, and the inconveniences attendant on the former method wholly obviated.

A practice different from either of these, was, I believe, invented by Mr. Bakewell, and is still pursued by some of his followers. At the intended season of copulation, the sexual appetite of the ewes is provoked by a ram, cui venter et genitalia panno circumteguntur, quo minus oves ineat. The ewes which are ready being thus discovered, are brought in succession to the proper ram, which is kept in a yard, or small inclosure, and is allowed to serve each only once. In this manner, a shearling ram, well fed, may be sufficient for 100, or more, ewes in one season. This method is certainly to be recommended, where any one ram is greatly superior to others in make, and other desirable qualities, relatively to a large number of ewes.

The time of admitting the ram to the ewes, if the latter are in heat and vigour, may be some time in the month of August, or at the beginning of September. But this requires that both shall have been, and continue to be, constantly well nourished. I have, at different periods, tried to give my rams oats; but could never induce them to leave grass for any dry meat. It may, indeed, be doubted whether, at this season, any food is so nutritious and invigorating as good grass.

If this method be adopted, the lambs will fall from the latter end of December, on through January; and four benefits will accrue in addition to those which I have specified. First, there will be the less chance of the ewes taking any unintended ram, either from our own flock, or from any neighbouring breed; a contingency, from which it is otherwise difficult to preserve them, and from which I have suffered great disappointment and loss. Secondly, the ram which we employ-

will have less time to be lost by disease, or casualties, to both of which he must be every moment subject. It is not easy for me to say what I would not have given had the ram, which I have mentioned as having died while with the ewes, been put to them soon enough to have impregnated the whole lot. Thirdly, from the more early fall of the lambs, they will be more fit for breeding, if we want to use them when 2-tooths; and, fourthly, a longer time will be given for the growth of the fleece, whether we shear it on the lamb or afterwards, making a difference of at least one shilling per head in its value, and a much greater difference in its fitness for manufacture of cloth from its superior length of filament, if clipped from the lamb.

In order, however, that this method may be beneficially pursued, two conditions are absolutely necessary. The lambs of the Merino, and Merino-Ryeland breeds come into the world extremely bare of wool, and are, therefore, proportionably subject to be affected by the severity of the weather at the inclement season at which it is recommended that they should arrive. I think it, therefore, indispensably requisite that every night the flock should be well sheltered; the ewes some time before and during lambing, and both ewes and lambs as long afterwards as the severe weather continues. This rule should generally be observed all through March; and, in deep and driving snows, and in the extremity of cold, should be followed even during the day. The ingenuity of every flock-master will suggest those means of effecting this purpose which are best adapted to his situation and circumstance, and some of which may be sufficiently economical. I have myself employed sheds built round my yard, walled up at the outside, and at the ends, and thickly thatched; or, occasionally, a large barn; taking care to give the flock plenty of straw for litter, which I have had carefully changed, before it became much broken or defiled with dung. This care well repays all the expense and labour. A great deal of excellent manure is thus obtained; the ewes become much better milkers, and the whole flock, whether of ewes or lambs, is preserved in the greatest health and vigour. This will appear from the state of my flock. Not one of my ewes has died; and out of 200 lambs, I have hitherto, April 2d, lost only 5, of which two were from 2-tooths, and one was produced dead.

In the union of the ram and ewes, there is one point of convenience to which it is well worth while to attend. It is absolutely necessary, for the safety both of the ewes and lambs, that the shepherd should constantly watch the flock, night and day,

during the season of yeaning. I have mentioned that the female goes with young 150 days. It is, therefore, of great importance so to regulate the time of copulation, as that, if possible, the lambs may fall in the light nights which take place from a week before to a week after the full of the moon.

It has long been a custom in Herefordshire to house, or, as they call it *cot*, their breeding ewes and lambs; and much benefit has been supposed to arise from a practice in many respects most erroneously conducted.

I have often thought of a very easy, cheap, and effectual method of sheltering sheep, which, however, I have never yet employed. This is what, I have since seen, is in some degree practised in Sweden. I would have the various ricks in the farm-yard made on a basis or floor of boards, elevated 5 feet from the ground; and under this floor the sheep might constantly, or occasionally, be sheltered. The ground might be littered, and kept clean like a house; and the ricks themselves would want little defence against the biting of the sheep. The additional expence of making the rick would be very trifling, and well repaid by what would be saved in the hay itself, of which a good deal at the bottom is often unfit for eating.

A second point essential to the success of this method, is a copious supply of proper food to the ewes and lambs. Every one acknowledges the value of good hay, of which I have never had any other sort, than of that which is usually called natural grass. This, when whole, should always be given in cribs rather than in racks, by means of which a smaller proportion is wasted, and the wool less spoiled. A sheep, when feeding on common hay, is, however, a most extravagant animal, often pulling out and treading under feet almost half as much as he eats. I am persuaded that this might be, in a great degree, prevented by cutting the hay into chaff, which would, otherwise, be more beneficial to the sheep himself. I must own, however, that I have never yet been able to effect this purpose to any considerable extent. Servants do not like extraordinary labour; and have always reasons to advance for not doing what they dislike. To these I have been obliged to submit, because personal superintendance would not repay me for time taken from much more important avocations. It is certain that considerable advantage in point of economy may be derived from attention to the nature of the hay itself. That which the sheep chiefly reject is the bents, or stalks. This points out a mode of lessening the evil. The hay should always be short, and of quick growth; in consequence of which it will be intermixed with few, or only succulent, stalks. On my

own land I have found that, by feeding to the beginning of May, a quick shoot of grass has immediately followed, which, if the weather permitted, has admitted of my cutting it in 5 or 6 weeks, so as to be of the quality above described: and though the weight of the hay has been in consequence less, I have not only been benefited by this saving, but have had the farther advantage of what is at least equally necessary, a plentiful supply of early aftergrass. Nothing, indeed, can be more destructive to the fertility of the land itself than the common mode of allowing grass to grow till the stalk is hardened, and the seeds are ready to fall. In consequence of the long and total exclusion of air, light, and moisture, the small under herbage totally perishes, the ground becomes full of ant-hills, and the new-mown field has more the appearance of a wheat stubble than of pasture. In this state it continues, if the season is dry, till late in the autumn. On the other hand, when mown early, the bottom is full of green leaves, which, from the retained moisture of the soil, and more especially from the slightest first rains, shoot forth, and, through the whole remainder of summer and autumn, clothe the surface with the most beautiful and profitable verdure. Hay so made will certainly be the most economical for sheep; but every one must adapt the period of cutting to the soil and situation of his own land.

There is a sort of dry food, which I have long been in the habit of giving to my ewes and lambs, and found highly beneficial. This is Linseed, served up in the following way:—one part of the whole seed is mixed in a tub with seven parts, by measure, of cold water, and suffered to stand all night. In the morning, the whole is once boiled up together. When cold, it forms a jelly, thicker than the white of an egg, which is given in troughs, either by itself, or mixed to a nearly dry state with hay cut into chaff. In either way the sheep soon eat of it readily, and the lambs themselves at a certain age. They all eventually become so fond of it, that they run in droves after the shepherd as soon as he appears with his buckets in the field, and lick quite clean the troughs in which it is put.

I have also given a small quantity of ground oil-cake to my whole flock. I first tried it boiled in water, as recommended by Fink; but they did not relish it so well as when it was given dry, and mixed with hay-chaff. In this method it was eaten for about a week by 31 ram-hogs, in the daily quantity of half a peck; from which, in two or three days, they began to scour, but soon recovered on being put on good rouen. It seemed to have made them very thirsty; in consequence of

which they might, probably, have drank too much water; but I did not choose to continue the experiment. I still give some of this oil-cake to the rest of my flock.

In default of other dry food, I have, during former winters, occasionally served my ewes and lambs with a small quantity of grains, which appeared to suit them well till the lambs came to eat them freely; when they purged them, and I was obliged to desist.

I have never fed my sheep with chopped straw, pease haulm, or various other dried vegetables recommended by the foreign agriculturists, and sometimes administered in England; neither have they ever had peas, corn, or bran.

It is certainly of great consequence to economize as much as possible meadow hay, which is, probably, the most expensive of all dry food. The lattermath of such grass, which foreigners greatly praise, is, doubtless, on account of its succulence and tenderness, an excellent food for sheep; and that of clover, lucerne, and sainfoin, is said to have the same good qualities. But during the short days in our cold and irregular climate, the chances are so great against the probability of gathering in these crops, properly dried for use, I think that we cannot depend on them.

Of meadow lattermath I have had some experience; but I conceive it to be not half so profitable as a sort of food which is almost always within our reach. I mean rouen, or aftergrass reserved through the winter. This grass, though many inches in height, is capable, in dry situations, of being kept without loss; and, at the latter end of winter and in the spring, will be eaten up clean by sheep and lambs of all descriptions. Hence, to those who want water meadows, or other early pasturage, it is a cheap and valuable resource, which never fails except when it is covered with snow. An experience of several years has proved to me its excellence; and we are under the greatest obligation to Mr. Young, for the pains which he has taken to make the public acquainted with its merits. Last year my shepherd was fully convinced that four acres of very indifferent upland rouen, given to my ewes and lambs, saved, at least, three tons of hay. For this purpose, it is usual to reserve only the aftergrass of lands which have been fed; but if they are mown in the manner which I have mentioned above, no injury whatever to the subsequent herbage will arise from saving the second crop for rouen; more especially if the

land be manured immediately after mowing, which not only greatly increases the quantity of this valuable produce, but that of the next summer's crop.

Rouen forms a sort of intermediate food between the dry and the green. I am now to speak of those which are purely of the latter kind.

Of turnips, I know little from experience, except that, on my farm, they are, in every respect, much inferior to the cabbage tribe. In proper soils they have, doubtless, great merit, especially in the mode in which they are cultivated in Northumberland; but on stiff land they are less productive; and every where more troublesome of culture, more subject to original failure and subsequent destruction, less affected by sheep and neat cattle, more difficult to eat, either on the ground where they grow, or elsewhere, and more liable to be covered with snow, and therefore unfit for use. The Swedish turnip is, in some respects, less objectionable than our former kinds; but to me would be of little value for late spring food, because it begins to shoot afresh in the month of April, when it is most wanted, and the root then becomes woody and unnutritive. In this species I have much regretted the waste which is sustained by the withering of the autumnal leaves. These are extremely numerous, very thick and large, and, doubtless, highly nutritious; but, during the following frost, decay, and are entirely lost. Were I again to cultivate this plant, I would try what injury the root would sustain by a cautious removal of these leaves as soon as they had ceased to grow.

I come now to speak of the cabbage, on which I have long been accustomed to place my chief dependence for the winter and spring food of my flock, and which, I can truly say, has never yet deceived me. There is, indeed, no part of the year, in which my sheep will not greedily devour it. Perhaps this vegetable may be peculiarly adapted to my soil; which is a somewhat stiff, and what the farmers call hungry loam, of from 4 to 6 inches in depth, and incumbent on a stratum of dry calcarious rubble stone. As the method which I pursue in cultivating the cabbage, which is chiefly the drum-head, has been tolerably successful, and is, in one essential point, different from that commonly practised, it may not be uninteresting to describe it in this place.

It seems to have been received as a general principle, that vegetables should always be transplanted into a good soil from one which is poorer; in conformity with which, seeds are seldom directed to be sown on highly-manured earth, but on

that of moderate quality. This principle is not only erroneous in theory, but disproved by the event in practice. We know that if an animal at his first appearance in life want a sufficient quantity of his natural food, he is diminutive, and never afterwards acquires his proper size. The same law affects him even before that period, while he is still in the womb of his mother. Look also at a tree or a shrub, which has grown in an unkindly and barren soil, and see whether it is not stinted, and does not rarely survive transplantation. We see this effect especially in trees which are tender, and not natives of our soil, such as those which bear certain fruits. Precisely the same thing happens with regard to seeds. Sow them in a poor soil, and they spring slowly and weakly, are subject to all the depredations of insects, and the inclemency of the seasons, arrive too late, if at all, at that state in which they are fit to shift for themselves in transplantation, and never acquire their just dimensions before the season comes, in which their growth ceases, or they are wanted for consumption.

The principle which I follow is exactly the reverse of that which I have described. I would treat seed like the fœtus in the womb of its mother, and a young plant like a young animal; and by a proper choice of seed, early sowing, warmth, defence against injury, and plenty of the most nourishing food, would push it rapidly, safely, and uniformly, through all its stages, so as, in the time which is limited for its growth by nature, to give it its greatest possible dimensions and succulence.

Conformably to these principles, we must begin with the seed itself. Experience shews that fresh seed vegetates more certainly and quickly than that which is older. That of the preceding season ought, therefore, to be preferred. It may readily be got by cutting off, in the month of February, the heads of cabbages sown the spring before, and transplanting the stumps into rich and well-sheltered ground, at a sufficient distance from all other varieties of the same tribe. As the spring advances, there will rise from these stumps a great number of shoots, which will blossom and become full of seed in the course of the autumn. From 4 or 5 dozen of stumps of the drum-head cabbage, properly guarded against birds, 3 or 4 pounds of excellent seed may, in a good season, be thus obtained.

When, therefore, I want this cabbage for spring feed, about the third week in February, if the weather will permit, I sow such seed, rather thinly, on a well-sheltered bed of deep, rich, finely pulverized and well manured mould, which has

been kept perfectly free from weeds the preceding year. At this season little injury may be expected from insects, which are yet unformed or torpid. As soon as the rough leaf of the plant appears, if the weather should become frosty, a mixture of finely powdered compost consisting of fresh earth, and rotten dung, or offal and blood from the shambles, is lightly scattered over them.* The same operation is from time to time repeated, as long as the frosts continue. If, in the middle of March, the weather should be dry, without frost, a gentle watering is now and then given them; and this watering is employed every day under the same circumstances, as the season advances. When they are two or three inches above ground, they are thinned, if too thick, and carefully weeded; and a liquid, consisting of sheep's dung, steeped in water, is once a week poured over them. If this method be uniformly pursued, it is highly probable that, in almost any season, the plants will, by Midsummer, be from eight inches to a foot in height. If the season has been at all moist, and otherwise favourable, they would, indeed, be fit for final transplantation by the latter end of May; and it would be very conducive to the weight of the crop, if the ground were prepared for them by that period. But, as we are seldom ready before the latter end of June, or the beginning of July, the plants if too much disposed to shoot in May, should be then pricked out, at 6 or 8 inches distance from each other, into a deep, well-manured, and clean piece of ground, in which, at their first setting, they should be once or twice well watered, if the weather prove dry. They will there strengthen themselves, gain fresh roots, and grow in bulk as well as height, till they are finally transplanted into the open field. The sooner this operation is performed, the better; and no crop can be depended on which is not planted out, at the latest, by the very beginning of July. The plants should be set at three feet distance, in the quincunx form, upon earth turned over fresh long dung placed in the furrow, and should afterwards be horse-hoed, and otherwise cleaned, in the manner described by Mr. Young, in his Farmer's Calendar, and other well-known publications. If the weather should be very dry at the period of final transplantation, it would, I think, be best, at all events, to perform that work, and trust to the well watering of the plants, rather than lose the time, which, at this season, is so precious. †

* Powdered pigeons' dung, or night soil, where they could be procured, would probably be excellent for this purpose, mixed with an equal quantity of fresh mould.

† Some time after writing the above paragraph, I had a fair opportunity of making a compa-

In this method, under moderately favourable circumstances of soil and season, cabbages may be obtained fit for use in the months of February, March, April, and even the beginning of May, which shall weigh from 5 to 25 lb. each. If the average be only 8 lb., and the plants be allowed a square yard each, the number of yards being 4840, the total weight per acre will be 17 ton 5 cwt.

To the ignorant reader all the work which I have described may appear very difficult, toilsome, and expensive. This, however, is by no means the case. The seed-bed lies in a small compass, so that 40 perch of ground will be amply sufficient to provide plants for the full stocking of 8 or 10 acres. The labour is consequently small, and the operations are neither nice nor expensive; but whatever they may be, let the reader weigh them against the result, and consider what comparison they bear with the total want of supply for several hundred ewes and lambs, or other stock, which their adoption would, with moral certainty, support in health, comfort, and rapid growth.

There is another mode of obtaining a crop of spring cabbages. They are to be sown, in the months of March or April, in rows, three feet, or three feet and a half asunder, on earth turned over fresh dung, in the manner before-mentioned. As the plants appear, they must be thinned out, so as to be left at the distance of two and a half, or three feet, from each other in the rows; after which, they are to be hoed, and earthed-up in the common well-known methods. This practice has certainly many important advantages. The season of sowing affords a good chance of securing the young plants against insects; and all the hazard and expence of transplantation, as well as the inconvenience of that operation, and of hoeing about Midsummer, when all our strength is barely sufficient for hay-making, are entirely avoided. If this method does not dispose the plants to become long and thin, rather than low and spreading, which latter habit they have after one or more transplantations, I know of no disadvantages to counteract its benefits, and therefore should prefer it, whenever land can be obtained early enough for the purpose.

rative trial of this measure. Upon the greater part of two acres of well-dunged land, I planted drum-head cabbages just before the extremely hot and dry weather which occurred at the latter end of May, or the beginning of June. Each plant was once well watered, just as it was put into the ground. They immediately took root, and continued growing very vigorously through the whole of the hot weather which followed. As soon as the weather changed, I finished the planting; but the later plants have never reached, and probably never will reach, two-thirds of the size of the former. The crop is, on the whole, the best I have ever seen.

If the cabbages are wanted for a winter crop, they must be sown in any moist weather between Midsummer and the 7th of July, on ground as before described. The same general rules should here be observed, with a difference suited to that of the season. It must be remarked, that this period of sowing is altogether against the order of nature. The seeds of the turnip, cabbage, and most esculent plants, would, in our climate, spontaneously fall in Autumn; and those, which escaped the frost, would vegetate in the spring from the first warmth and moisture, unmolested by insects. At Midsummer, every thing is directly contrary. The earth is dry and parched, and animal life is strong, whether in those which creep, or those which fly. More attention is therefore necessary to frequent watering; and effectual means must be adopted to preserve the young plants at their first appearance from the ravages of the slug, and of the fly. The latter makes various perforations in the tender leaves, and is injurious principally by its numbers. The former will destroy a whole crop in a night, just as if the plants had been mowed off with a scythe. For this evil various preventive means have been recommended; but none I think effectual. The most common, and which sometimes succeeds, is that of sprinkling powdered lime every night over the leaves and beds. The efficacy of this measure depending partly, if not principally, on the causticity or biting quality of the lime, it should be as dry, and quick as possible. With keeping, it absorbs carbonic acid from the atmosphere, and becomes mere chalk. It should be applied at night, an hour, or longer, after the plants are watered. The seed-bed being, as I have before observed, of no great extent, other more efficacious methods might, doubtless, be discovered and adopted. Two of these have occurred to me; and, if circumstances permit, shall have a fair trial during the ensuing summer.

The Midsummer plants having reached a proper size, should be pricked out in a warm and rich nursery bed in the month of September, where they are to remain till the March following; when they should be transplanted into the open field, at four feet asunder, in the quincunx form, and treated in the manner beforementioned. Some persons prefer the distance of four feet from row to row, and three feet in the rows; but in this method I have found the plants too much crowded, though it may possibly suit very poor soils. A crop thus managed may easily, on rich deep ground, reach from 40 to 50 tons an acre. On my shallow soil and high land, with little aid from manure, I have raised more than 32 tons per acre; and have had cabbages, of which the head alone has weighed 50 lb.

This crop will begin to be fit for use, by the bursting of some of the cabbages, about the latter end of August, and will continue till the month of February, when it will be met by the spring crop above described. Many persons have complained of its maturity at a season, when, as they say, it is not wanted; and, in order to obviate this pretended evil, recommend a transplantation so late as even the month of May. But this expedient, on one hand, does not prevent the evil against which it is intended to guard, and, on the other hand, by shortening the period of vegetation in the plant, much diminishes the weight of the crop. It is surely a strange kind of reasoning, by which a man deduces evil from abundance, at any season of the year. There is no season at which a store sheep will not profitably eat a cabbage; and if, by this expedient, we can save our grass, and thus lay up a greater provision of rouen for our ewes and lambs in the spring, we shall certainly obtain a very valuable end.

The extent to which drum-head cabbages, well cultivated on a few acres of good and suitable land, will go in feeding sheep, would not be believed by those who have not made the experiment. With me, no frost has materially hurt them; and it requires a very deep snow to cover them. In a more northern situation, even in this island, they may not, however, in these and certain other respects, equal the Swedish turnip. They may be given to the sheep once or twice a day, either at a distance from the ground producing them, by cutting off the head, and giving it three or four chops with a bill-hook; or on the ground itself, by folding the sheep on various parts of it in succession. In both ways, the cabbages are cleanly eaten up; and, in the latter, much more easily and profitably than turnips, great part of which is under ground, and mixed with the dirt of the soil. The sheep wholly consume the head of the cabbage, and even scoop out the stem to a considerable depth.

If the winter and spring cabbages are to be followed by a summer and autumnal sowing, or planting, the stumps should remain as long as possible in the ground, and will produce a very copious growth of sprouts, which will be advantageously fed off by the ewes and lambs before ploughing.

Besides the drum-head cabbage, I have fed my sheep, at the commencement of the autumn, with early York and Battersea cabbage, planted out in the spring. In the year 1804, I thus planted less than an acre and a quarter of land, on which sheep were kept as follows:—From August 17th, 30 ewes were on it for four

days, and then taken off and put on grass for three days, with a cart load of the cabbages given them daily. From the 25th of August to the 31st, both inclusive, 24 ewes, six ram-stags,* six 4-tooth and two 2-tooth wethers, were constantly fed and folded on them. These were then taken away, and 57 ewes and a ram were kept on them for some days. These were followed, on the evening of the 7th, by six old rams, two wethers, and 45 ram-lambs. On the 10th, the ram-lambs not eating them well, the whole lot was removed, and 41 ewes, ram-stags, and wethers were substituted. On the 21st, 10 ewes and 11 ram-stags and wethers were taken away, leaving only 20 old ewes, which finished the cabbages on the 2d of October. All these sheep did well except the ram lambs; and those who witnessed this experiment thought the result a proof not only of the value of cabbages, but of the capacity of my sheep to support hard keep without the least inconvenience. This conclusion will be confirmed when I state, that I did not come into possession of the ground till the latter end of March; that it was poor, and full of weeds; and that the cabbages were not planted till the middle of April, without manure, and at two feet asunder, which proved to be much too great a distance for their eventual growth: In consequence of all which circumstances, the produce could not fairly be estimated at much more than half a crop.

Every one knows the value of rape as a spring food for sheep and lambs. I have found it very profitable.

I have occasionally given my sheep carrots and a few potatoes. But my soil is too shallow for the former, and the latter has hitherto been chiefly superseded by the cabbage. I have, indeed, found great difficulty in making my sheep eat them; and, at this moment, having a considerable quantity applicable only to the feeding of cattle, am trying a variety of expedients in order to accomplish that end.

One or other of these kinds of food should never be wanting, not only for the supply of milk to the lambs, but for the nourishment of the adult and growing sheep. Dry hay alone is unnatural; and, if it does not disagree with the animal in the winter, renders him exceedingly prone to scour, when he suddenly changes it for fresh grass in the spring. A proper and regular admixture of green vegetables through the winter prevents this effect, not only by having been habitual, but by disinclining the sheep to gorge themselves with food of a new flavour.

I formerly raised for my sheep the succory, chicoree, or wild endive (Chicoreum

* Our provincial name for rams cut after they are one and a half or two years old.

intybus) which chooses to live on banks by the road side, and shoots luxuriantly during the hottest and most arid summers. Sheep seem rather to affect bitters, and therefore do not dislike the taste of this plant. It is generally considered as a biennial; but I have found it remain many years in the ground, shooting its fibrous roots to a great depth, so that I was unable to destroy it. On a dry, rubbly soil, nothing surely yields such a quantity of herbage. Wishing accurately to examine its produce, I once weighed half a perch of a middle growth, of the second year, which I had suffered to remain uncut till the beginning of July, and found it to be 37 ton 8 hundred per acre. In November I cut and weighed the plants on the same half perch, which amounted to 25 ton 10 hundred. Many of the plants, at the first cutting, were from 6 to 8 feet in height, and the stalks were grown so hard and woody as not to be eatable. My servant had before remarked the same inconvenience, when the sheep were soiled with it; which would not have happened if they had been placed on it in great numbers, in order to feed it off like clover, or ray grass. That a plant shoots early, and grows so much and so quickly, that one's stock can with difficulty consume it, will hardly, I should think, be attributed to it as a fault. An annual produce of 62 ton 18 hundred of green food per acre is surely very extraordinary; and, probably, would not have been less, had the shoots been continually cropped in their succulent and tender state, as soon as they sprang. The ignorant prejudices of my servants, and my having lost possession of the field in which this plant had grown, obliged me, at that time, to discontinue its use; and now, that I have wished again to try it, I have in vain attempted to procure the genuine seed.

I have generally provided for my sheep winter and spring vetches, the former of which has been raised alternately with spring cabbages. The latter being finished in May, and the shoots fed off in July, the ground has been sown with winter vetches, which have been folded off by the latter end of May, and the soil left in a very rich state for the immediate planting of spring cabbages as before.

My manner of feeding and treating my ewes and lambs, during the winter and spring, will best appear from that which I now practise with regard to 74 ewes, and as many lambs. Early in the morning they have 56 lb. of hay in cribs, in a grass field adjoining to the farm-yard. At $\frac{1}{2}$ past 4 in the afternoon, $3\frac{1}{2}$ cwt. of cabbages, cut in pieces, are given them, strewed on the grass in the same field. As soon as it grows dark, they are driven under the sheds, where 28 lb. of hay is

allotted to them in cribs; and five nights in the week they have in the house, 10½ quarts of linseed made into jelly, with seven times as much water; sometimes alone, at other times mixed with a little chaff of hay in troughs. The two other nights they have, instead of the jelly, six gallons of ground oil-cake mixed with chaff in the same manner. What remains of the cabbages at night, is eaten up clean in the course of the following morning.

Salt I never gave to my flock but once, and that in the following way: A small field of lattermath, cut in September, had been so often wetted, that I despaired of its ever being eaten. While it was putting into the rick, I strewed some salt between the layers; the consequence of which was, that cows and sheep greedily devoured it, scarcely leaving a single blade.

CHAPTER VII.

Treatment of the Diseases of the Merino-Ryeland Breed. Hydatids in the Lungs. Giddiness. Foot-rot. Scab. Scouring. Hippobosca Ovina, or Sheep-Tick. The Fly and Maggots. Tetanus, or locked Jaw.

Let us now advert to the treatment of the chief diseases of the Merino-Ryeland breed of sheep.

For hydatids in the lungs, and the giddiness, I know of no cure. The French writers think that young sheep, which are chiefly subject to the latter disease, are guarded against it by not being shorn when lambs; but Lord Somerville assures me that, so far as his experience goes, this opinion is ill-founded.

In the foot-rot, it certainly would be a proper precaution to separate, if possible, the unsound from the rest of the flock, and put them on land which is drier, and less deep in herbage. Experience has shewn that sheep are least liable to this malady on ploughed or fallow land. It is easily cured. For this purpose, pare off, with a sharp knife, so as not to make the part bleed, all the spongy and decayed parts of the hoof and frog, and, instead of applying strong caustics, such as the vitriolic acid, so as to corrode the parts, and produce a worse disease than that which it was intended to remove, rub into the affected parts, every other day, a little of a mixture of equal quantities of powdered sulfate and acetite of copper,

(blue vitriol and verdigrease) mixed up with crab verjuice to the consistence of a pulp. The disorder will generally disappear in from two to four dressings, especially if the sheep be kept on dry and hard ground, or boards, so as not to rub or wash out the application to the feet.

In the shab, scab, or itch of sheep, which is evidently infectious, still greater care is necessary immediately to separate the unsound from the sound. The latter should not even be suffered speedily to follow the former in the same field, or yard, or to eat and drink out of the same racks or troughs. The infectious matter, like that of the itch in man, is capable of being rubbed on, and adhering to, that which it touches. It may even long stick to the wool or skin, without producing any apparent disease. For this reason, the itch itself is seldom contracted by the better classes of people, who frequently change their garments, and use constant ablution, while it is common among the lower orders, who are incapable of the former measure, and careless of the latter. It could only have been from an experimental conviction of the truth of this principle in sheep, that the Romans directed their Oves molles, or Merinos, to have the skin, after shearing, well imbued with a mixture of equal quantities of the lees of oil and wine, and a decoction of the lupine; and, on the fourth day afterwards, to be thoroughly washed in the sea, or, if that was not practicable, in salted rain water. Cato and Columella relate that, by this process, the sheep were certainly guarded against the Scabies for the whole ensuing year. * They must, however, have supposed them to be, at the time, free from all actual eruption, and to be interdicted from all subsequent communication with infected sheep.

This advice of the Roman writers appears to me so sensible, that I shall every year, in future, follow it with regard to my whole flock, so far as to wash them well in clear running water, during the first warm and dry weather which occurs after shearing. This process, at the same time that it must clear the skin and short wool from infectious matter, and from sweat rendered acrid by long stagnation,

* M. Caton. de re rustica cap. xcvii. Verum ea, quandocunque detonsa fuerit, ungi debet tali medicamine: Succus excocti lupini, veterisque vini fæx, et amurca pari mensura miscentur, eoque liquamine tonsa ovis imbuitur; atque ubi per triduum delibuto tergore medicamina perbiberit, quarto die, si est vicinia maris, ad littus deducta mersatur; si minus est, cælestis aqua sub dio salibus in hunc usum durata paullum decoquitur, eâque grex perluitur. Hoc modo curatum pecus anno scabrum fieri non posse Celsus affirmat. Columellæ vii. 4.

must tend also to destroy what remains of the sheep-tick, which is, in every respect, one of the greatest pests of fine-woolled sheep and their fleeces. With these views, the water of the sea may be employed by those who are near it; and others, who would wish to imitate the same practice, may do so by mixing salt with clear river, spring, or rain water, in the proportion of one pound to four gallons. The new-shorn sheep will soon dry, and appear much refreshed by this measure, which cannot possibly be injurious to them, as it is found, by the long experience of butchers, to contribute to their speedy fatting in the summer and autumn.

The cure of the scab is more difficult in the Merino and its crosses than in our native breeds, probably on account of the greater delicacy of the skin, and the thickness and imperviousness of the fleece. A variety of remedies is recommended by the ancients and moderns. I have been much disappointed at finding in my flock a total failure of success from the Lincolnshire ointment, quoted in my former essay. The substances which are chiefly effectual, are various preparations of salt, tobacco, and essential oil or spirit of turpentine. In Bristol they sell a cheap liquid, under the title of Shab water, which is a pretty strong infusion or decoction of the stalks and waste leaves of the tobacco, in sea water; in what proportions I know not. To a pint of this, if a quarter of a pint of essential oil of turpentine be added, in a bottle stopped with a perforated cork, and the scab be gently scraped off, especially round its edges, with a blunt steel or ivory knife, or even with the nail, so as, if possible, not to draw blood, and a little of the liquid, well shaken, be poured through the hole in the cork on the diseased spot, the animal will be cured in a few days. For this purpose, however, it is necessary, even in the slightest cases, that every single scab should be so treated once, or, at most, twice; and the earlier this is done, the more quickly the disease will yield. I know of no good method by which the distemper can be cured by a sort of general influence, like that of sulphur on the itch in the human species. Sulphur itself, on account of its filthiness, and the injury which it would probably do the wool, I have never tried. It appears to me, however, that much advantage would be derived from washing in salt water, in the manner above-mentioned, all the sheep which either have the disease, or have been exposed to it; in consequence of which, the former will, probably, be more easily cured by the subsequent application of the scab mixture, and many of the latter, if separated from the

infected sheep, preserved from all appearance of the disease. This, however, ought not to be done with regard to the fine-woolled breeds of sheep, till after they are shorn.

For common scouring in sheep or lambs, when it is the result of mere indigestion, I have found the following an effectual remedy. Take of salt and whiting (refined chalk) reduced to a fine powder, equal weights. Dissolve the salt in four times as many pints of water as there are pounds of salt, and then add the powdered whiting by small quantities at once, stirring it well with a clean dry stick, stripped of its bark, so as to mix the whole to a smooth consistence like cream. Simmer it over the fire till it becomes thick;* and afterwards keep it near the fire till it becomes a stiff mass, capable of being formed into pellets, which should be made of the size of the tip of the middle finger, dried by heat in a Dutch or common oven, and kept, free from moisture, for use. Of these pellets, five were given to each of my ram-hogs, every other morning, on an empty stomach; and they got well after 5 or 6 doses. At the same time very little water was allowed them. A proportionably greater number of these balls should be given to larger or older sheep.

The Hippobosca ovina, or tick, is extremely injurious to sheep, by making the animal bite and rub itself so as not only to hurt the fleece, but to break the skin; in consequence of which the fly is apt to fix on the wool near the wounded part, and there deposit its eggs. This troublesome animal may be, in a great measure, destroyed, by pouring a solution of powdered white arsenic in boiling water, in the proportion of an ounce to a gallon, cold on the back of the sheep, and letting it diffuse itself down the skin on each side. In this method, however, several of the ticks escape by crawling to the extremities of the filaments. It will be still better to wash the lambs in the autumn, whether shorn or not, in a tub of a similar mixture. For this purpose, three pounds of the same arsenic powdered, may be dissolved in six gallons of boiling water, and the solution mixed with 40 gallons of cold water. The whole being then well stirred with a stick, the lambs may be plunged into it, great care being taken that they do not dip their heads, or taste the water. The liquor must be squeezed out of their fleeces back into the vessel, in order that it may not be wasted. It is scarcely necessary for me to point out the

* Great care must be taken to remove it from off the fire before it becomes dry; or otherwise a part of the chalk may become lime, and consequently deletereous.

poisonous quality of this liquid; and how necessary it is to keep the vessel locked up, and after the operations are performed, to clean it well, or rather, never to use it for any other purpose; and to throw the liquid which remains, where not the smallest quantity of it can be drank by any creature whose life we value.

In hot and damp weather, in low situations, and near hedges and woods, the fly is extremely noxious to sheep. It deposits its eggs on the wool near any wound or scratch made by thorns, thistles, briars, or any other cause; or even by its own bite. No parts are more subject to this annoyance than the head and neck of the ram, where the flexure of the horn prevents him from rubbing or touching himself. The eggs soon become maggots, which, quickly crawling to the wounded part, eat and destroy all around them, and, in a very short time, kill the animal. All accidental wounds should, therefore, be carefully watched, and immediately rubbed with an ointment of equal parts of tar and mutton suet melted together. The fly dislikes the tar, the part is defended, and the ointment is readily washed out with water. On the latter account, it may be prudent to repeat the application if necessary, especially in rainy weather. The same remedy may be applied to any part where maggots have actually been formed, the maggots having been previously killed by sprinkling on them the root of white hellebore, finely powdered. I have no knowledge of the effect of powdered charcoal recommended by the Spaniards. Any cheap and effectual method of guarding against the ravages of the fly, without injury to the sheep, or wool, would be a most valuable acquisition to farmers.

Two of my lambs died last year of a disease unknown to my shepherd, in which their heads, necks, and limbs continued rigid and immoveable, during the three or four days which it lasted. It was similar to the Tetanus, or locked jaw in the human race; and was, most probably, owing to their ears having been bored, for the purpose of marking, with a red-hot iron, too close to their heads. I had them bled, and cold water poured over them, without effect.

This is all which I know as to the prevention and cure of the diseases chiefly prevalent among the Merino-Ryeland breed of sheep.

CHAPTER VIII.

Management of the Fleece. Every thing which can tear or defile it to be avoided, or removed. Doubt as to the Propriety of shortening the Tail. Sheep not to be washed before Shearing; which preserves the Wool from the Moth. Season, and Mode of Shearing. Wool varies in Weight after being shorn. Process of reducing it to the Spanish State, by Gilbert. Expediency of public Lavatories for this Purpose. Attempt of the Romans to improve the Fleece. Question as to shearing the Lambs.

In order to prevent the waste of the fleece, the pastures ought to be carefully freed from thistles, briars, loose thorns, the burdock, clivers, and all other weeds. They either tear off the wool, or drop among it their rough seeds, or parts of their hooked capsules, which cannot afterwards be separated without much loss, labour, and consequent expense. The hay should be such as has been made before seeding, and should be given in upright racks, or, which is still better, in cribs; and the litter should be changed before it is either much broken, or defiled with excrements. The fly should be attentively guarded against; and we should extirpate the Hippobosca, which, in addition to other injuries, fills the fleece with its excrements and exuviæ.

The ordure, which adheres to the tail, should be constantly cut off. With a view, partly, to this end, it is customary in Spain, as well as in this country, to shorten the tails of lambs to within three or four inches of the root; an operation, which is also supposed to improve the hind quarter of the sheep. I think, with the French, that the latter effect is owing to a mere optical deception; and we may justly doubt the propriety of the measure in other views. The tail was surely not given to the animal for nothing; and among other purposes, that of defending himself from flies and other insects, was probably one. It adds, also, one or two ounces of useful wool to the fleece; and, unless the sheep be intended habitually to travel, may easily enough be kept clean.

With the Spaniards, I totally object to washing the wool on the sheep's back before shearing. The fleece is so thick, that, when thoroughly soaked with water, it is very long in drying; and, if the weather prove wet and cold, the sheep is evidently much incommoded. Besides, the waste in this way is, as I have before observed, very variable, so as utterly to incapacitate us from forming an accurate judgment of what remains of the yolk, and, therefore, of the value of the wool. On this ground, I think that the proprietors of fine-woolled flocks are personally interested in withstanding the prejudices and present ignorance of the dealers in wool, with regard to that which continues in the yolk. Another reason against washing is, that wool, in the full yolk, may be kept for several years without danger from the moth, which then scarcely ever touches it; or breeds only in the dirty points, where the yolk is least abundant. This circumstance ought to be generally known among the growers of wool, as it gives them an opportunity of safely waiting a reasonable time for a proper market. If it be objected that a difficulty may arise from the averseness of the shearers to clip unwashed wool, I answer, with regard to myself, that having entertained them liberally, I have always found them perfectly satisfied.

My time of shearing has been about the second week in June; but the proper period must depend on climate, season, and other circumstances. I think that the nature of the fleece requires that it should be performed earlier in the Merino, than in our native breeds, more especially on the 2-tooths which have not been shorn when lambs; and I have never known the sheep receive injury at the time which I have specified. If, however, very cold or wet weather should follow, it would be right to house them for two or three nights or days after the operation. The wool should be clipped round the animal, and entirely separated at one cut, which cannot be done in the common method of shearing lengthways. Twenty-five or thirty of the Merino-Ryeland breed are as many as a man can properly shear in one day.

The place in which the sheep stand in preparation for shearing should be perfectly free from straw, hay, or dung; and they should be shorn, if possible, either on a barn floor, or on a temporary stage of boards under a shed, which should be carefully swept as each sheep is finished; and the relics which drop out should not be mixed with the fleece-wool, but put into a basket, or heap, by themselves. I have found that a fleece, wound up in the common way with the band of wool

moderately twisted, is much firmer in handling, or moving, than when tied up with twine.

The wool should be kept in baskets, or wooden compartments, rather than in bags, which are liable to be rotted by the yolk. It is subject to become damp by absorbing moisture from the atmosphere, and will, therefore, generally be found to weigh more in the winter, and, of course, to waste more in scouring, than in hot weather, when it is first shorn. To this change we may doubtless attribute the common prejudice, that wool grows after having been separated from the animal. If, however, it be re-examined, after a continuance of hot and dry weather, it will appear to have been, by evaporation, nearly, or quite, reduced to its original weight. In the Agricultural Dictionary, called The Complete Farmer, I find the following experimental table of changes in weight, suffered by wool in different successive months.

Wool shorn dry, and laid up in a two-pair of stairs room, on a boarded floor,

				lb.	oz.
1746	August	10	weighed	76	6
	September	7	———	76	8
	October	14	———	77	11
	November	18	———	78	0
1747	January	26	———	80	0
	February	20	———	80	4
	March	23	———	79	8
	April	18	———	77	13
	June	24	———	76	8
	July	28	———	76	8
	September	16	———	75	15
	November	2	———	78	1
	December	8	———	78	14
1748	February	15	———	79	1

Another parcel of wool, under the same circumstances, weighed as follows:—

				lb.	oz.
1756	August	30	weighed	36	9
	November	19	———	37	2
1757	February	19	———	37	12

				lb.	oz.
1757	March	24	——	37	6
	April	1	——	37	4
		21	——	36	14
	May	2	——	36	13
	June	1	——	36	8½
		13	——	36	4
	July	8	——	36	1½
		27	——	35	12
	September	30	——	36	4
1758	January	25	——	37	11½

Wool certainly appears to become somewhat coarser by lying very long in the yolk; which, according to Vauquelin, may arise from some incipient decomposition. I know, however, that it may be so kept two or three years without the least injury.

In order, however, wholly to prevent this effect, and to produce a readier and more equitable sale of the wool, I have already proposed to reduce it, by washing after it is shorn, either to the Spanish state, or to absolute cleanness. For this purpose, it must be first sorted in the manner already described, after which it may be cleaned in the following method, which is the French improvement on the common process of the Spaniards, published by Gilbert.

The perfection of washing depends a great deal on the season. If possible, it ought to be done before the middle of October. After this period, the water employed in washing would cool too soon, and the shortness and coldness of the days would make it difficult to dry the wool.

On the evening of the day before that on which it is proposed to wash, the wool is to be carefully opened, and spread, as much as possible without breaking, on large hurdles, supported by tressels. It is then to be gently beaten with two small sticks tied together, and to be well shaken, in order to separate, as far as can be, though still very imperfectly, the dust and small particles of hay, straw, &c. which may have been entangled in it. It is proper, though not mentioned by Gilbert, that each sort of wool should be separately submitted to these and the following operations.

If any parts of the fleece are knotted or entangled, so as not to be easily penetrable by water, they are opened with the fingers, or, if that be ineffectual, with a

sort of fork in each hand, having short, distant, and crooked fingers of metal. A tolerably adroit workman will finish all these operations on an entire fleece in 3 or 4 minutes at farthest.

The wool is then thrown into one or more tubs, proportioned in size to the quantity which is to be washed. When they are full, the wool may be well pressed or trodden in, and water is to be poured on it, heated to about the 144th degree of Fahrenheit's thermometer, till it reaches the top of the vessel. In this manner the wool must steep for at least 8 or 10 hours; or it may remain even 24 hours, if convenience require it.

The water thus impregnated with yolk is not to be thrown away, but is essential to the operation of washing. When, therefore, the wool is taken out, as much of it as possible should be allowed to drain back into the tub.

One or two boilers, according to the quantity of wool to be washed, are now filled about two-thirds full of this yolk-water; which is gradually warmed till it reaches about 150 or 160 degrees of Fahrenheit. Less than 144 degrees are insufficient, and more than 167 are found to make the wool hard, crisp, and friable. The proper degree of heat is that, which begins to be too great for the hand to bear.

At this heat, a quarter or half of a fleece is thrown in, according to the size of the boiler. The less there is at once, the more perfect will be the scouring. Then for 3 or 4 minutes the wool ought to be moved, by continually lifting it up with a small fork of wood, so as to separate the portions as much as possible. If it were turned, it would entangle, which would not only prevent it from being thoroughly cleaned, but render it less fit for the subsequent operations which it is to undergo.

The water being now at such a temperature that the hand can bear it, the wool is to be taken out either with the hands or with the fork, and is put into a basket, which is held for a moment over the boiler, in order to save the yolk water. It is then carried to the water in which it is to be rinsed.

In proportion as the water in the boiler wastes, the loss is repaired by the gradual addition of fresh yolk-water, as every portion of wool is taken out; so that the heat may be kept up to the same uniform standard. When the yolk-water, by successive immersions of new wool, becomes thick and muddy, the boiler is emptied, and the bath is entirely renewed.

The water employed for the purpose of rinsing should be as soft as possible. A

clear running stream is, on many accounts, best. The water of wells is the worst; but where no other can be obtained, it may be meliorated by exposure to the air for some days, or even by being previously boiled.

The wool is rinsed in large baskets of open wicker-work, in order that the water, in passing through them, may carry off all the extraneous substances which may have adhered to it. In running water, two such baskets, each of an oblong square form, are fixed near each other, at the bottom of the water, so that the sides of the basket shall be some inches above the surface, in order to prevent the water from carrying away the wool. The wool is washed in the basket which is farthest down the stream, the higher basket being meant to receive it after it has been so washed. Here it is fully purified from every thing which may have escaped the washing immediately preceding.

To the perfection of this last operation, nothing contributes so much as the manner of performing it. The wool must never be rubbed, which would twist, and even felt it. It is sufficient to move it briskly in the running water, and to open it as much as possible with the two hands; or, if the work be on a large scale, to move the wool constantly from one end of the basket to the other, by means of a rake. When it appears to open well, rises to the surface, and spreads itself there like a sort of cloud, and, at the same time, the water runs transparent out of the basket, the wool is thrown into the upper basket, where it is allowed to remain for a few minutes, and is then taken out to dry.

When one is forced to wash in stagnant water, it is necessary to line the bottom in such a manner, that the water may not easily become muddy. In this case it is necessary to use a smaller basket, with two lateral handles, by means of which it may be plunged in and out of the water, till it comes out perfectly clean.

Instead of draining the wool, as it is taken out, on an inclined plane of stone, which is the first process of drying practised on a vast scale at the washing-places in Spain, Gilbert recommends a method which, he says, he has found much more expeditious, and which is to squeeze out the water by means of a press. According to him the pressure is so far from being injurious to the wool, that it causes it to open the better. Is is easy to see what benefit must arise from thus enabling a person to finish the whole operation of drying in one single fine day.* For this purpose, the wool, when takenfrom the press, must be spread on dry turf, previously cleaned by raking and brushing.

* I believe that this method is employed in many of our English manufactories.

Were the growers of fine wool in England to concur with me in opinion as to the propriety of preparing it for sale by washing it in the Spanish method, this would be best effected by the construction of public lavatories as in Spain, in which the wool of each proprietor might be carefully washed, at a fixed rate of expense. In such a case it will readily suggest itself to every person acquainted with our present proficiency in the arts, that considerable improvements would immediately be made on the directions of Gilbert. Till that period, every individual, acting for himself, should choose experienced workmen, who would perform in the best manner every part of the process.

The wool thus washed, being only in the Spanish state, and still containing a portion of the yolk, which consists of fat incapable of being detached by the saponaceous part aided by hot water, farther means will be necessary in order to remove it. To effect this purpose our manufacturers employ urine. According to Vauquelin, fresh urine, which contains uric acid, and therefore decomposes the soap of the yolk, is, on that account, detrimental to this operation; and stale urine, which derives its power merely from a small proportion of ammonia and mild pot-ash, is inadequate to it. Nevertheless, it certainly succeeds in this country; which our manufacturers explain by supposing that the urine of beer drinkers is chemically different from that of those who drink weak and ascesent wines. Whether this be true, or whether the difference arise from some superiority of skill in our workmen, I cannot determine. Some persons recommend, for the same purpose, a small quantity of pot ash or soda; and Vauquelin advises soap, in the proportion of about one-twentieth of the weight of the wool.

The Romans were of opinion that the fleeces of their sheep were rendered finer and heavier by the processes of unction and salt-water bathing, which they employed as preservatives against the scab, and which I have already described. Columella, indeed, recommends that they should be thrice a year anointed with oil and wine, and washed in fine weather. * Of this process I have had no experience; and the methods which I have described are the best, with which I am acquainted, for doing justice to the wool of the various Merino breeds.

Agriculturists differ much as to the propriety of shearing the lambs. I have

* Sæpius ejus lana diducenda, vinoque et oleo insuccanda, nonnunquam etiam tota est eluenda, si diei permittit apricitas: Idque ter anno fieri sat est. Columell. vii. 4.—Nec dubium est quin etiam ob eam rem lana quoque mollior atque prolixior renascatur. Columell. vii. 4.

shewn that the wool of many of those of this race is comparatively coarse, even in those individuals, in which the fleece afterwards acquires the finest quality; and the cloth which I have at various times had made, as well as that which I have now the honour to exhibit, fully proves that the fleeces of others may be profitably employed in this way. The wool is also in general excellent for Salisbury flannel, and the coarser sort for the manufacture of hats. Mr. Tollett has done me the favour to present me with a pair of warm stockings, softer than silk, made of the wool of his Merino lambs. On the other hand, Lord Somerville exhibited last year, at the annual meeting of the Bath Society, a piece of cloth manufactured by Mr. Joyce, from the wool of his shearling Merinos unclipped when lambs, which was of excellent quality. Should this be found to be uniformly the case, much trouble and expense might be saved to the grower. The lambs, if bathed in arsenic water, would be tolerably freed from the tick, and possibly guarded against the fly; and, according to the opinion of the above nobleman, they would be worth three or four shillings a head more, in point of carcase, for having been unshorn during the winter. The French have proved that no loss of wool is sustained by leaving it on the lamb; but in the Merino breed it has been supposed most advantageous to reduce the fleece about an ounce, by clipping off the dirty and ragged ends of the wool. No such management is, however, necessary in the Merino-Ryeland lambs, the wool of which is rarely shaggy like that of the pure race. It would be easy, in looking over the lambs about the end of July, to distinguish the coarse from the finer, to shear the former, and leave the latter unshorn, for cloth, till the following year.

My lambs have always been shorn, unwashed, at the end of July, or beginning of August, and have not appeared to suffer any injury. If they are washed in arsenic water in the manner proposed, they will, probably, not require any subsequent ablution in order to guard them against infection, or the effects of uncleanliness.

CHAPTER IX.

Little Judgment to be formed as to the Wool or Carcase of the Merino-Ryeland Sheep from those of the Lamb. Lambs weaned at once. Question as to getting rid of the Horn. Shortened with the Saw. Useful for Marking. The Ear usually employed for that Purpose. The Method of Sir Joseph Banks the best. Pitch-mark on the Wool. No effectual Substitute hitherto discovered. Red-hot Iron on the Forehead.

From what I have said above with regard to the relative quality of the lambs-wool, it will easily be inferred that, in them, I have never been able to form a decisive judgment as to the future fineness of the fleece; and I am persuaded that a still worse decision can, at that period, be made as to the size and proportions of the carcase. In the month of October I have usually divided my ram-lambs into classes by numbering them, with a view, where it was practicable, to keep them separate according to their size and strength; and I have often found that some of those, which were then among the smallest and worst, became, by the following summer, the heaviest and best proportioned. After the shearing them, I have examined them carefully, weighed a good many of those which I preferred, and accurately noted down the particulars. Even so soon as two months afterwards, when I have repeated the same examination, I have found a change in them, not at all proportioned to what their former appearance promised. I go still further, and say, that our judgment, as to the qualities of wool and carcase in this breed of sheep, cannot be accurately formed before they are $2\frac{1}{2}$ years old; for which reason I do not like either to employ or part with my shearling rams, and much less my lambs. The same circumstances make me much more averse to the castration of the lambs; which I never perform except on those, which have either sprung from coarse-woolled ewes, or are grossly defective in point of carcase. Some loss, both of profit and credit, is, doubtless, sustained, by being obliged annually to cut a considerable number of 4-tooth rams; but this loss bears no comparison with that of an excellent ram. Ignorant persons foolishly wonder that, for such a ram of the Merino race, Mr. Tollet refused 200 guineas; but to a man solicitous for the

establishment of a perfect flock, a ram pre-eminent in every point is absolutely inestimable, especially in a breed in which the choice is necessarily confined within such narrow limits. Actuated by similar views, I have at present rams, for which I would not take twice the sum offered to Mr. Tollet.

I have hitherto weaned my lambs at once, without any apparent disadvantage either to the dam or the young; but it has been necessary to milk the ewes twice or thrice afterwards, at the interval of two or three days.

I have mentioned that most of the Merino rams and their male descendants have long horns, and I have touched on some of the inconveniences of this appendage. According to the Romans, animals so furnished are more quarrelsome than polled sheep, as if from some consciousness of superior capacity of annoyance.* This evil in the Merino race is, however, chiefly confined to the rams; for, as I have before observed, the ewes are hornless; and so also are many of the wethers, if cut when lambs. With regard, therefore, to the sheep intended for fatting, and the ewes, which are chiefly valuable for the increase of the species, there will usually be none of that waste of food which goes to the supply of a head proportioned to large horns; and as soon as a flock is become nearly equal in goodness of wool and carcase, a breeder, who is not desirous of keeping many rams for sale, need not, probably, for the mere purpose of improvement, save of his horned sheep more than $\frac{1}{6}$ of his whole stock. If, however, the entire banishment of the horn be desired, I know that it can, in a great measure, be effected by breeding from knot rams. Sir Joseph Banks is attempting this object in the Royal Merino flock. In the Merino-Ryeland it is still less difficult, because the proportion of knot rams seems to increase as we breed in and in. Accordingly, of 31 ram-lambs saved by me last year, chiefly for their wool, 6 are either polled, or have short snags, exclusively of 3, which are hornless, and which, by way of experiment, were bred from a ram, whose horns and head were unusually light and small.

In order to diminish the capacity of the horned rams to do mischief, I should advise breeders to follow the practice of the Spaniards, by cutting off with a saw, in the month of October, some inches of the horns of the lambs; after which, it is convenient to mark them, as nearly as possible to the base, with a red-hot iron. The same cutting, and the marking, if necessary, should be repeated the August following, so as to leave only 6 or 7 inches towards the root or base.

* Columellæ vii. 3.

By breeding the rams polled, we lose this great convenience of numbering them with Arabic figures on the horn. In knot sheep, the ear is usually chosen for this purpose; but, from what I have said above, cannot be so treated, at an early age, without some risk. With proper care, marks on that part may, however, be safely made, so as to speak a pretty copious language. Lasteyrie has given us a whole system of numerotage, or numeration; but experience shews that many cuts on the ear are liable to fail, either from the subsequent reunion, or the accidental tearing out of the parts; and, therefore, where a very nice numeration of individuals is required, I greatly prefer the method of Sir Joseph Banks, which consists in passing through the ear a wire, to which is appended a small label of lead, stamped with the number desired.

In this breed, the pitch-mark, usually employed to indicate on the wool the name of the owner, should, if possible, be wholly avoided. It is difficult, however, to know what to substitute. Nothing has yet been found, which will resist rain combined with the saponaceous quality of the yolk, and afterwards dissolve in urine or alkalis. I have tried Dr. Lewis's receipt of powdered charcoal mixed with melted suet, but found it ineffectual. The colour was good, and it worked easily; but, in common even with pitch, it lost its distinctive figure as the wool grew, and, long before the time of shearing, was totally washed out. This effect was more to be expected in the Merino races than in our breeds, on account of the greater proportion of yolk which imbues their fleeces. If the sheep are marked with pitch, it should be done on the upper part of one of the hinder thighs, where the wool is coarsest. A mark has been by some persons proposed to be made on the forehead with a red-hot iron. But, in this breed, the great quantity of wool on the forehead would require that it should be made low down on the nose.

CHAPTER X.

Mode of forming a Floch, which shall have superfine Wool on a beautiful Carcase. Choice of breeding Animals. Proof of the superior Agency of the Ewe in determining the Form of the Carcase, and of the Error of choosing large Rams. What is called Blood. *A Merino-Ryeland Ram, of superior Wool and Carcase, better for Breeding than a pure Merino inferior in those Points. Imprudence of attempting, at present, to mend the Carcase of this Breed, by employing the best Rams of our native Races. Propriety of dividing the Flock into different Classes, according to their Sex and Strength. Project of breeding Sheep with Wool of native Colours. A trial of new Crosses. Conclusion.*

Something still remains for me to say on the best mode of forming a flock, which shall combine, in the greatest degree, the essential points of wool and carcase. I do not see how, in the beginning of such an experiment, we can proceed with equal pace towards these two objects. If our view be goodness of form, we need not go for that purpose to Spain, but may much better accomplish it, in a single day, in Sussex, or Leicestershire. The new and great point is to superinduce the Merino fleece. A sheep with such a fleece, on a carcase equal to our wishes, is hardly now to be found; and whether in the Merino breed, or its crosses, is not to be made by chance. No method of ultimately attaining this end occurs to me, but that of uniformly choosing for propagation, at first, those rams which have the best fleeces; after which, when the wool of the whole flock is arrived at the ultimate standard of fineness, we shall doubtless be able to select, among a great variety, animals which are also excellent in their forms. If, as happened to myself at an early period of my labours, the best-woolled ram chance to have the best carcase, let us thankfully avail ourselves of our good fortune.

That the female has more influence in the production of form than the male, I have already made probable in speaking of my own flock. I had a strong confirmation of this last year, when the lambs got by my finest-woolled ram, which was not well-shaped, and smaller than most of the other males, turned out to be larger, and better formed, than the generality of my other stock. The same thing hap-

pens in other animals; but in none more evidently than the common mule, which, when produced by a she-ass from a stallion, is weak and small, but by a mare from a male-ass, sometimes reaches 15 or 16 hands in height, and is proportionably large. In dogs, my experience has been exactly similar. Some years ago I coupled a mastiff, 2 feet 5 inches in height to the top of the fore-shoulder, and much the largest about the chest and neck that I ever saw, with a smaller though well-formed bitch. The offspring were of an intermediate height; but, comparatively, long-legged, flat-sided, and narrow-chested. These facts collaterally confirm the opinion of Mr. Cline, that, in order to procure healthy, stout, and well-made offspring, our chief attention ought to be paid to the size and form of the mother; and that a sire, extraordinarily large, by generating young, which the dam is unable, at any period, properly to nourish, causes them either to be abortive, or weak, lean, and mis-shapen. These principles we should always bear in view as to our sheep; not forgetting, however, the due form of the ram, any more than his appropriate size. The capacity of readily growing fat being, in this breed, one important point, the actual fatness of any individual ram kept with the rest, is a practical evidence of that species of perfection, and should, therefore, have considerable influence on our choice.

In every point of view it is probable that a ram of the cross breed is as good for the purposes of propagation as an equally good Merino, and better than one which is inferior. I hear a great deal of what is by the unlearned called Nature, and and by those who fancy themselves more learned, Blood. But I would ask, what is the import of these words? Do they mean certain mysterious properties inherent in any one unmingled race? No. Our best race-horses are only mongrels; that is, the produce of mongrel mares, either by pure Arabians, or by sires, which were equally mongrel with themselves. Yet we do not hesitate to consider King Herod or Highflyer as blood-horses, just as much as if they had immediately descended from a pure Arabian sire and dam; and we should certainly have preferred them for propagation to any pure Arabian stallion, which was inferior to them in valuable properties. These properties are very different in different animals. In a race-horse, which is intended for running, they are speed and facility of breathing, united with only a certain degree of strength. In this animal, fatness would be one of the greatest evils. On the contrary, in a Leicester sheep, the marks of blood are smallness of bone, shortness of legs, and largeness of chest, all tending to fit him for

indolence and obesity. The evidences of blood in a bull-dog are very different from those in either of the former examples.

The word blood, then, is nothing more than an abstract term, expressive of certain external and visible forms, which, from experience, we infer to be inseparably connected with those excellencies which we most covet.

The same principle is equally applicable to Merinos, and their descendants. There is no reason why a good fleece should be connected with a bad form; and I should presume that a pure Merino is not the more valuable because, at present, he happens generally to have a narrow hind-quarter, sharp shoulders, and flat ribs. Those sheep, whether pure or mongrels, are best, and therefore, in the philosophical and practical sense of the word, have most blood, which combine the finest fleeces with the most approved forms. Experience has shewn that such rams of the mixed breeds, as well as our cross-bred stallions, can transmit to their posterity all their excellencies, whatever may be their names, or from what country soever they may have been derived; and he, who at this time, in beginning to breed, prefers the best pure Merino ram to the best Merino-Ryeland, will probably find himself eight years behind in the experiment.*

It is probable, that, in order to obtain sheep with heavy fleeces, those rams should be preferred, which are woolly all over the face, and down to the fore as well as hinder hoofs.

Some persons have proposed meliorating the carcases of the Merino races by crossing the females with rams of better forms, though of coarse wool. It is clear, however, that that they have totally misconceived the effect of this intermixture on the fleece. If the diameter of the filament in the Merino or Merino-Ryeland be as 0, and that of the Wilts or Leicester, as above, be 128, then one cross of either of those rams will bring the wool of the progeny to 64, which is the state of the original Ryeland before crossing with the Spaniard. What then are we to do next? Will the carcase be better than the Ryeland? If not, and we proceed to cross with the Merino, we might just as well have commenced with the Ryeland ewe as the basis of our experiment. If, on the other hand, we go on crossing with the coarse ram, we are going backwards from the Ryeland as to the fleece. The very first cross of the fine Merino-Ryeland ewe with the Leicester carries us, therefore,

* From this decision I must perhaps except the ram of Lord Somerville, No. 20, which, probably, cannot, at present, be equalled in symmetry by any ram in England with equally good wool.

back to what we were at the commencement of our experiments eight years before. In a Merino-Ryeland ewe of the 3d cross, the Spanish blood being as 48, and the Leicester as before, 128, one cross of the latter will produce a fineness or diameter of filament as 88; which will be three-eighths coarser than the original Ryeland. If the filament of the coarse ram be still larger, the deterioration of that of the progeny will be greater in proportion.

This reasoning corresponds with the experience which I have at various times unfortunately had from the casual union of my ewes with South Down, Wilts, Dorset, and Leicester rams. In such cases, it will be best, as soon as possible, to discard the bastard produce.

The only chance of successfully attempting this end, will be after the filament of the Merino-Ryeland ewe shall, by long attention to that point, have lost strength by over-refinement: in which case, a cross of the best and finest-woolled South Down ram, might possibly improve the carcase, and reduce the wool to the same standard of fineness as the native Spanish piles.

Among the different means of improving a flock, nothing seems to promise greater benefit than a division into classes, according to age and strength. The robust almost always harass the weaker, and drive them from their food. This happens more especially to the rams, whom the sexual appetite renders otherwise mischievous, and to whom the horn gives a greater power of annoyance than to the other sheep. Wherever, therefore, a separation is practicable, it should always be adopted.

In a preceding part of this work I have mentioned the great value which the antients, unskilled in the art of dying, attached to wool naturally coloured. A knowledge of this fact leads to the probable conclusion, that the celebrated Argonautic expedition to Colchos had no other object than the acquisition of a breed of sheep, whose fleeces were ερυθρα, rutila, or of a golden colour. Exclusively of their cheapness, cloths so made would have much greater softness, lustre, and durability, than those, which had undergone the repeated application of great heat, and the corrosion of chemical mordants. M. Charles Pictet is, at this time, attempting to renew, in his hybrid flock, these experiments of antiquity. I have had several sheep with blackish, or reddish brown fleeces; and I have now a specimen of M. Pictet's wool, of a rich medium between those hues. I fear, however, that we could never insure an uniformity of tint, not only through the same flock, but in

the same fleece, and even in different parts of the same filament. This difference would unfit such wool for mixed cloths, and much more for those of uniform colours. Besides, such is the present versatility of European taste, that no one could ascertain a demand for cloth of any single and uncommon colour even for a year. There is still another, and a fatal objection, if, as I am informed by clothiers, such wools are more apt to fade, than those which are dyed. They certainly suffer this change when exposed to the weather on the sheeps' back; the outside of a fleece, which next the skin is black, being always of a brown or russet colour at shearing time. For these reasons, I fear that M. Pictet's success will not equal the classical merit of the attempt.

Thus have I faithfully related every thing important, which, either from my own observation, or good authority, I know on the subject of the pure Merino and Merino-Ryeland breeds of sheep. The reader will have observed that I have, on many occasions, by the nature of the task which I have undertaken, been obliged to make comparisons between my breed and those of others; and if, in such comparisons, I have stated the results as in some respects favourable to that which I happen to possess, I solemnly declare that, in so doing, I have been actuated by no motives of personal interest, but solely by the love of what has appeared to me to be the truth.

The fact on which I have enlarged above, of the disposition in the Merino-Ryeland breed to assume the paternal fleece, and retain the maternal shape, has naturally led me to the conclusion, that this principle might be advantageously applied to the union of the finest-woolled rams with coarser ewes, pre-eminent as to form. With this view, I am now trying my rams with ewes of the Leicester-Ryeland, and Leicester-South Down crosses. The experiment, however, is begun somewhat late; and, at my age, I can hardly flatter myself that I shall live to see the result.

In the mean time, it is our duty to make even our pleasures subservient to the general good, and cheerfully to leave events to Him, who alone knows how to direct them.

April 4, 1806.

SUPPLEMENT.

Methods of measuring minute Objects, of Daubenton, Luccock, Herschel. Actual Measurements of various Specimens of clothing Wool. Inferences. Conditions of accurate microscopical Comparison. Result of a comparative Trial between Merino-Ryeland Wool and that of the Coronet and Alva Piles, in the Manufacture of Broad-cloth, and of a similar Comparison with R. X. S. Wool in that of Casimir. Wool-produce per Acre on the Author's Farm in 1806. *Probably much short of its eventual Produce. Weight of the Fleeces of the Author's Merino-Ryeland Rams sold to Mr. Birkbeck of Wanborough. Increase of Weight and Value in his South Down Fleeces from one Cross of that Breed. State of the same Cross as to Carcase. Carcase of the Author's Ram-lambs in* 1806. *Statement of his Lambing Account in* 1807. *Result of the Administration of Potatoes in* 1806 *and* 1807. *Conclusion.*

In various parts of the preceding Essay, I have had occasion to speak of the comparative fineness of the wool of different flocks of sheep, both of the pure and mixed breeds. Those who are most accustomed to such enquiries will readily confess how difficult it is to distinguish with the naked eye between the diameters of objects so minute as the filaments of the finest Merino wool. This difficulty has induced certain persons to render such examinations more decisive by means of magnifying glasses. Daubenton, first of all the authors with whose works I am acquainted, in a memoir on this subject presented to the French Academy of Sciences, in the year 1779, proposes to measure the diameter of the several filaments by a micrometer divided into squares of the 120th part of a French inch. The microscope which he employed seems to have been of the compound kind, in which the

micrometer has its subdivisions magnified by its being placed in the focus of the eye-glass; and whatever may have been the magnifying power of that glass, the lineal magnifying power of the whole apparatus appears to have been 14 times as great as that of the eye-glass.* In this case it is obvious, that if a filament of wool placed on the stage of the microscope extends exactly from one parallel side of a square in the micrometer to the next side, the filament so magnified is in diameter precisely $\frac{1}{1680}$ of a French inch, or about $\frac{1}{1573}$ of an English inch.

Now surely nothing can be more gross or inaccurate than this mode of examination. The filament must be so placed, as to lie precisely parallel to the sides of some one square of the micrometer. If it presents itself diagonally, the micrometer no longer affords a rule of mensuration. According to the common construction of the compound microscope, the micrometer is included in the tube, and cannot be shifted relatively to the object, while the eye is engaged in observing; and with regard to the filament itself, it must be considered, that the space through which it is moved on the stage is magnified proportionably to the compound magnifying power of the whole apparatus relatively to that of the eye-glass. If, therefore, the side of each square of the micrometer be $\frac{1}{120}$ of an inch, and the magnifying power of the microscope be 14 times as great as that of the eye-glass, if in attempting to adjust the position of the filament on the stage, we shift the stage only $\frac{1}{140}$ of an inch, the apparent space through which the filament is moved will be $\frac{1}{10}$ of an inch, which will be equal to 12 squares of the micrometer.

Let the reader for a moment consider the difficulty of such an examination in any case, but more especially in that of an object so subtle and tremulous as a filament of wool, of which many hundreds may require to be successively measured, and he will readily admit the inapplicableness of this method of Daubenton.

* Un micromètre represente un petit réseau. Cet instrument étant placé dans un microscope, on juge de la grosseur du petit objet que l'on observe, par l'espace que cet objet paraît occuper dans le micromètre, parceque l'on sait quelle est l'étendue des mailles du micromètre, et combien de fois le microscope grossit l'objet que l'on y voit. *Instruction pour les Bergers, p.* 338.

Il n'y a qu'un dixième de ligne entre les côtés paralèles des carrés du micromètre dont je me sers pour mesurer la grosseur des filamens des laines. Il est placé au foyer de l'oculaire du microscope. La lentille grossit quatorze fois; par conséquent, la grosseur d'un filament de laine qui est au foyer de cette lentille, et qui paraît occuper par sa largeur un carré entier du micromètre, n'est que de la cent-quarantième partie d'une ligne. *Ibidem, p.* 340.

Neither is its inaccuracy less than its difficulty; for if, after we have succeeded in making one edge of a filament exactly correspond with one side of a square in the micrometer, the diameter of the filament were in the smallest degree less or greater than the $\frac{1}{1680}$ of an inch French, the other edge of the filament would not reach, or would reach beyond, the next parallel line of the micrometer, and we should be left merely to guess at the diameter.

If it were attempted to remedy this defect by a micrometer more minutely subdivided, those sub-divisions would be proportionably inaccurate; and the difficulty of adjustment before stated would remain in full force.

These methods, therefore, promise little success; and the inaccuracy of the results, which I shall hereafter point out, strongly confirms the opinion that they are inadequate.

What mode Mr. Luccock has employed in order to apply a scale to a magnifier, he has not informed us; but from the errors of mensuration into which he also appears to me to have fallen, I think it probable that his method is still far from being correct.

Under these difficulties I applied for assistance to a man, whose genius and science are only equalled by the warmth of his friendships, and the readiness with which he communicates his knowledge to those who are desirous of sharing it. Dr. Herschel advised me to make use of the method which he has described in the account of his lamp-micrometer, published in the Philosophical Transactions for 1782;* and also in a letter to Sir Joseph Banks, contained in the same volume.† Availing myself of these suggestions, I found, that, after some experience, the relative diameters of any minute objects could easily and with great precision be ascertained by the following method. An object of a known diameter being placed on the stage of the microscope in a strong light, and a piece of white paper spread horizontally beneath it, look through the tube at the object with both eyes open, and you will see its image projected on the paper below, which you may then measure with a pair of compasses, and take off the aperture on a diagonal scale minutely subdivided. Divide this magnified image by the known diameter of the object, and you will find the magnifying power. This being found, place on the stage the object, the diameter of which is sought, and having measured with the compasses, as before, the diameter of its image projected on the paper below, divide that diameter by the magnifying power, and the quotient will be the real magnitude required.

* Page 165. † Page 174.

I applied these principles in the following way. The microscope being so disposed that I could look through it while sitting on a high seat, a piece of white paper, smoothly pasted on a small cube of wood, was placed on the ground immediately beneath. Having found that a proper degree of distinctness could not be obtained by day-light, I made my examinations at night, the object being strongly illuminated by the light of an Argand lamp reflected in the usual way from the concave speculum below the stage of the microscope. The distance from my eye to the paper below being now the greatest that I could reach with a pair of compasses at arm's length while looking through the microscope, I found the image of the object projected on the paper to be magnified 1250 times. I then took a small lock of scoured wool, consisting of 60 or 80 filaments; and having gently strained it longitudinally on a strip of glass, I waxed down both ends, so as to keep the filaments immoveably fixed. The wool being thus disposed, the lower side of the glass was blackened with Indian ink, except in certain narrow spaces exactly in the middle, and at the distance of $\frac{1}{2}$ an inch from each end of the lock, as represented in the following figure.

The unblackened spaces being then placed in the focus of the microscope, 10 filaments in each were successively examined, and their images on the paper below carefully measured with compasses on a scale exhibiting 400ths of an inch. The magnifying power, as above stated, being 1250, if the projected image of a filament measures $\frac{4\,2\,0}{4\,0\,0}$ of an inch, then $\frac{4\,2\,0}{4\,0\,0} \div 1250 = \frac{8\,4\,0}{1\,0\,0\,0\,0\,0\,0}$ of an inch: in decimals, 0,00084, and in a vulgar fraction $\frac{1}{1\,1\,9\,0}$ of an inch. Or if the sum of 10 observations be $\frac{3\,8\,6\,5}{4\,0\,0}$ of an inch, then $\frac{3\,8\,6\,5}{4\,0\,0} \div 1250 = \frac{7\,7\,3}{1\,0\,0\,0\,0\,0\,0}$ or 0,000773 $= \frac{1}{1\,2\,9\,4}$ of an inch; which is the mean diameter of the 10 filaments in that part. Each lock of wool being thus examined in three different parts, the mean of the three measurements in decimals was divided by three for a mean diameter, which was reduced into a vulgar fraction by the common method. In this mode, therefore, the fineness of each end, and of the middle of each specimen, is deduced from the mean diameter of 10 filaments; and that of the whole specimen from the mean diameter of 30 filaments.

Table of comparative Diameters of the Filaments of various clothing Wools.

No.	Outward end of filaments. Inch.	Middle. Inch.	Inner end. Inch.	Mean. Inch.
1 Ewe,	,0008114 = $\frac{1}{1232}$	,0006976 = $\frac{1}{1433}$	,000681 = $\frac{1}{1468}$	,00073 = $\frac{1}{1370}$
2 King's Merino Ewe,	,0007696 = $\frac{1}{1299}$	,0008354 = $\frac{1}{1197}$	,0007004 = $\frac{1}{1428}$	,0007685 = $\frac{1}{1301}$
3 Ram No. 25,	,0008712 = $\frac{1}{1148}$	,000766 = $\frac{1}{1305}$	,0007244 = $\frac{1}{1380}$	,0007872 = $\frac{1}{1270}$
4 Lastiria Pile,	,0008724 = $\frac{1}{1146}$	,0008226 = $\frac{1}{1216}$	,0006794 = $\frac{1}{1472}$	,0007915 = $\frac{1}{1264}$
5 Ewe,	,0009538 = $\frac{1}{1048}$	,0007802 = $\frac{1}{1282}$	,0006578 = $\frac{1}{1520}$	,0007973 = $\frac{1}{1254}$
6 Ram No. 89,	,0008938 = $\frac{1}{1119}$	,0008274 = $\frac{1}{1209}$	,0006966 = $\frac{1}{1436}$	,0008059 = $\frac{1}{1241}$
7 Coronet Pile,	,0008188 = $\frac{1}{1221}$	,0008194 = $\frac{1}{1220}$	,0007828 = $\frac{1}{1277}$	,000807 = $\frac{1}{1239}$
8 Native Merino Ram,	,0008722 = $\frac{1}{1146}$	,0008102 = $\frac{1}{1234}$	,0007488 = $\frac{1}{1335}$	,0008104 = $\frac{1}{1234}$
9 Saxon,	,0008192 = $\frac{1}{1220}$	,0008392 = $\frac{1}{1191}$	,0008372 = $\frac{1}{1194}$	,0008319 = $\frac{1}{1202}$
10 Pictet's pure Merino Ram,	,0008452 = $\frac{1}{1183}$	,0008144 = $\frac{1}{1228}$	,0008502 = $\frac{1}{1176}$	,0008366 = $\frac{1}{1195}$
11 Ram No. 1,	,0009052 = $\frac{1}{1105}$	,000843 = $\frac{1}{1186}$	,0007616 = $\frac{1}{1313}$	,0008366 = $\frac{1}{1195}$
12 Best Negrette Pile,	,0008514 = $\frac{1}{1175}$	,0008526 = $\frac{1}{1173}$	,0008182 = $\frac{1}{1222}$	,0008407 = $\frac{1}{1189}$
13 Alva Pile,	,0009216 = $\frac{1}{1085}$	,0008098 = $\frac{1}{1234}$	,000815 = $\frac{1}{1226}$	,0008488 = $\frac{1}{1178}$
14 Ram No. 111,	,0009086 = $\frac{1}{1100}$	,0008628 = $\frac{1}{1159}$	,0007796 = $\frac{1}{1282}$	,0008503 = $\frac{1}{1176}$
15 Ram No. 93,	,0009692 = $\frac{1}{1032}$	,0008138 = $\frac{1}{1229}$	,000792 = $\frac{1}{1263}$	,0008583 = $\frac{1}{1165}$
16 Ram No. 109,	,0010058 = $\frac{1}{994}$	,0008502 = $\frac{1}{1176}$	,0007184 = $\frac{1}{1392}$	,0008581 = $\frac{1}{1165}$
17 Rambouillet Ewe,	,0009372 = $\frac{1}{1067}$	,0008818 = $\frac{1}{1134}$	,0008142 = $\frac{1}{1228}$	,0008777 = $\frac{1}{1139}$
18 Ram No. 101,	,0009614 = $\frac{1}{1040}$	,0009114 = $\frac{1}{1097}$	,0007652 = $\frac{1}{1307}$	,0008793 = $\frac{1}{1137}$
19 Imperial Pile,	,0008958 = $\frac{1}{1116}$	,0009548 = $\frac{1}{1047}$	,0007956 = $\frac{1}{1257}$	,0008821 = $\frac{1}{1133}$
20 Morfe,	,0009006 = $\frac{1}{1110}$	,0009796 = $\frac{1}{1021}$	,0007694 = $\frac{1}{1300}$	,0008832 = $\frac{1}{1132}$
21 Ryeland,	,0009584 = $\frac{1}{1043}$	,0008362 = $\frac{1}{1196}$	,0008746 = $\frac{1}{1143}$	,0008897 = $\frac{1}{1124}$
22 South-Down,	,000975 = $\frac{1}{1026}$	,0008764 = $\frac{1}{1141}$	,0008516 = $\frac{1}{1174}$	,000901 = $\frac{1}{1110}$
23 Ram No. 95,	,000989 = $\frac{1}{1011}$	,0009214 = $\frac{1}{1085}$	,0008044 = $\frac{1}{1243}$	,0009049 = $\frac{1}{1105}$
24 Ram No. 100,	,000963 = $\frac{1}{1038}$	,0009124 = $\frac{1}{1096}$	,0008736 = $\frac{1}{1145}$	,0009163 = $\frac{1}{1091}$
25 Ram Knott,	,000998 = $\frac{1}{1002}$	,0009642 = $\frac{1}{1037}$	,0008366 = $\frac{1}{1195}$	,000933 = $\frac{1}{1071}$
26 Anglo-Negrette Ram,	,0009854 = $\frac{1}{1015}$	,0009816 = $\frac{1}{1019}$	,0008712 = $\frac{1}{1148}$	,0009461 = $\frac{1}{1057}$
27 { Negrette Ram, Marquis of Bath,	,0010052 = $\frac{1}{995}$	,001027 = $\frac{1}{973}$	,0008214 = $\frac{1}{1217}$	,0009512 = $\frac{1}{1051}$
28 Charenton Ram,	,0009558 = $\frac{1}{1004}$	,0010764 = $\frac{1}{922}$	,0009178 = $\frac{1}{1090}$	,0009967 = $\frac{1}{1003}$
29 Ryeland Ram,	,0010594 = $\frac{1}{944}$	,0010528 = $\frac{1}{950}$	,0009212 = $\frac{1}{1086}$	,0010111 = $\frac{1}{989}$
30 Cape, 4th. Cross,	,0011702 = $\frac{1}{855}$	,0010032 = $\frac{1}{996}$	,001031 = $\frac{1}{970}$	,0010681 = $\frac{1}{936}$
31 Wilts Ewe,	,0012146 = $\frac{1}{823}$	,0013864 = $\frac{1}{721}$	,001136 = $\frac{1}{880}$	,0012457 = $\frac{1}{802}$

Of the different specimens above examined it must be remarked, that all the rams with numbers subjoined were of my Merino-Ryeland flock; and so also were the ewes with the numbers 1 and 3 prefixed. The ram No. 11 was full-mouthed; the others shearlings, previously shorn when lambs; the ewes of uncertain age. The pure Merino rams of Pictet and Chabert were also of unknown age; as were all the other sheep, except the pure Merinos with the numbers 8, 26, and 27 prefixed; of which the first and last were full-mouthed, and the second, I believe, a six-tooth.

The specimens of the Rambouillet ewe and Charenton ram were given in 1802 to my son, Dr. Charles Parry, by Chabert, Professor of the Veterinary School of Maisons at Charenton, to whom both belonged. With that of Pictet, I was favoured by Mr. Poole. It was considered by its owner as superior in fineness to that of any other Spanish ram which he had seen. The Morfe and Ryeland wools I many years ago procured from a highly estimable relative and friend, professionally well acquainted with the value of this commodity; and the South Down from Mr. Joyce in 1806, from the noted flock of Mr. Ellman. For the Cape wool, as I have already mentioned, I am indebted to Sir George Yonge.

Of the native Spanish piles, I have been, during the last fourteen years, in the habit of collecting the finest samples from all my friends among the neighbouring manufacturers. Those of the Coronet and Negrette above examined were not of the adulterated kind now imported, but the best of 8 or 9 years ago. The Alva was selected for me by Sir Samuel Wathen, and the Lastiria by Mr. Sheppard of Uley, both within these 3 years, as specimens of uncommon beauty. The Imperial was given me in the year 1805 by Mr. Mathews, formerly Secretary of our Agricultural Society, to whom it was presented by a wool merchant of Bristol, expressly as a standard with which to compare mine. Of German wool I have many samples, some of which were sent me by Professor Blumenbach of Göttingen; but none appear to me finer than that which I have examined, and with which I was favoured, in 1806, by Mr. Gordon Grey.

The specimens of my rams' wool were all, except that from ram No. 11, taken from between the shoulder and the neck; and, in all the examples of my flock, from the living animals, except in the two ewes, and in the ram above-mentioned. The three last were from an uncertain part, having been selected by me out of the fleece after it was shorn. This was also the case with the three pure Merino rams, numbers

8, 26, and 27. All the other specimens were necessarily from unknown parts, but were carefully chosen as the very finest of the whole sample within my reach. The sex of the animal was not positively known except where expressed; but, in other cases, was, probably, always the female.

Except in those instances in which I received the wool in an unscoured state, I could not always precisely ascertain the different ends of the filament. The specimens, of which I was thus obliged to judge from probability, were those to which are prefixed the numbers 3, 4, 7, 9, 11, 12, 13, 19, 20, 21, and 31. In every case, the measurements were taken from the first ten filaments which presented themselves with sufficient distinctness.

From these measurements it appears,

1st. That the wool of one of my ewes was considerably finer than that of any other kind which I had an opportunity of examining; and the wool of another nearly as fine as the best Spanish pile.

2dly. That the wool of two of my rams, both of which sprung from Merino-Ryeland sires, with ewes of the same cross, was finer than that of any ram of any breed, which it has been in my power to measure; and that of one of them superior to any imported wool of either sex.

3dly. That the wool of all my rams, similarly descended, which I have measured, was finer than that of 3 out of 5 of the pure Merinos.

4thly. That the Negrette breed of sheep is greatly improved in its wool by having been introduced into England; the specimen from the Royal flock which I have measured, being finer not only than the finest of that pile which I have been able to procure from Spain, but than any other Spanish pile which I have seen.

5thly. That the Merino wool may be considerably improved in fineness by an admixture of the Ryeland breed, and afterwards by breeding in and in from the 4th cross with that breed; the ram No. 6 being the grandson of No. 11, and the great grandson of No. 27, all from ewes of the 4th cross.

6thly. That in a coarse-woolled breed of sheep, as that of the Cape of Good Hope, 4 crosses of the pure Merino are by no means capable of bringing the wool of the produce to an equality in fineness with the paternal race.

7thly. That so far as these observations go, the form of the filaments of clothing wool is not that of two cones joined together by their apices, but that of a single cone, of which the apex is next the skin.

The same observations suggest many other important enquiries, which will require various new experiments, but of which, as my leisure from more important avocations may chance to permit, I shall not lose sight.

We are told by Daubenton, that there is no wool, however coarse, which has not in it some filaments, of which the diameter does not exceed the 560th part of a line of the foot-royal of France.* Now the French line being the 12th part of an inch, and the French foot-royal being to the English as 1068 to 1000,† the diameter of such filaments will be $\frac{1}{6720}$ of a French inch, or $\frac{1}{6292}$ of an English inch. So also, according to the same author, the finest wool has some filaments, of which the coarseness reaches $\frac{1}{1440}$ of a line, or $\frac{1}{1680}$ of a French inch, corresponding, as before, to $\frac{1}{1573}$ of an inch English; and this latter diameter he gives as the lowest size of the finest wool.‡

Now out of upwards of 1100 measurements which I have made, the smallest diameter which I have ever found was at the inner end of a filament of my Merino-Ryeland ram No. 6, the projected image of which, magnified 1250 times, was equal to $\frac{1}{400}$ of an inch, making the real diameter of that part of the filament only $\frac{1}{2978}$ of an inch: and the smallest mean of 10 measurements was only $\frac{1}{1520}$ of an inch, as specified in the table, in the inner end of the filaments in my ewe No. 5.

On the other hand, in each of the finest specimens of wool which I have examined, which are the 6 first in the table, there were one or more filaments from $\frac{1}{1028}$ to $\frac{1}{892}$ of an inch in diameter; and instead of admitting $\frac{1}{1573}$ of an inch as the lowest term of superfine wool, out of more than 1100 measurements I have found only 42 filaments, of which any part reached that degree of minuteness.

According to Mr. Luccock, a sample of moderately fine Spanish wool reached $\frac{1}{1600}$ of an inch; and the average diameter of the choice locks of native English

* Avec ce micromètre appliqué au microscope—j'ai vu qu'il n'y avoit point de laines, même des plus grosses, ou il n'y eût des filamens très fins, dont la grosseur n'est que la cinq-cent-soixantième partie de la ligne du pied de roi. *Instruction pour les Bergers, p.* 339.

† Throughout this work I have assumed this proportion of the French to the English measure from Greaves, who took it from the French standard preserved in the Chatelêt. If, according to Hutton's Dictionary, article Measure, we allow it to be only as $1065\frac{3}{4}$ to 1000, the difference, in the instances in which I have applied the rule, is of no consequence, and easily calculable by the reader.

‡ Les laines les plus fines ont quelques filamens, dont le grosseur va jusqu' à la cent-quarantième partie d'une ligne. J'ai fixé à ce point le premier terme de la laine superfine. *Instruction pour les Bergers,* p. 339.

wool was $\frac{1}{1400}$. The reader will compare the first term with the measurements which I have made. With regard to the latter, among 135 filaments of Morfe, Ryeland, and South-Down wool which I have examined, I have met with only 4, which have been so small as $\frac{1}{1400}$ of an inch in diameter.

If therefore my specimens were good, and my measurements are accurate, those of both these authors must be erroneous.

In order to make a perfect comparison between the wool of different breeds of sheep, or different individuals of the same breed, the following rules should be observed.

1st, The paper on which the wool is projected should not be more than 4 inches square, and should always be placed in the same spot, at precisely the same distance from the object and eye.

2dly, Each lock of wool should consist of filaments as nearly as can be of equal lengths; should be well scoured, as much as possible spread, and moderately strained on the glass, which should be blackened in the manner before specified, after the filaments are fixed by the cement.

3dly, In the microscopical examination, no selection should be made of filaments; but the first 10 which, as the stage is gently shifted, distinctly present their images on the paper below, should always be taken.

4thly, The specimens to be examined should, where it is practicable, or the occasion may not require the contrary, be taken from the same part of the animal, from animals of the same age, of the same degree of fatness, and at the same season of the year.

Due regard being had to these precautions, many valuable discoveries on the growth and improvement of wool may doubtless be made.

Having thus established the fineness of my wool relatively to that of the pure Merino, by the test of the microscope applied to particular specimens, I have to add the result of an experiment in the gross, made since my former communication to the Board. Messrs. Yeats of Monk's Mill, Glocestershire, having in 1806, been chosen by the Agricultural Society of this city, under the Premium Class V. No. V., to make a piece of Navy-blue broad cloth of wool grown in England, comparatively with some native Leonesa pile, executed that trust with equal zeal and ability. In order that the trial might be the more complete, they manufactured in a precisely similar manner three pieces, of which two were of the Coronet and

Alva Spanish piles, and the third of my Merino-Ryeland wool. The report to me respecting my cloth was, in Mr. Yeats's own words, " by the account " received from our agent respecting that and its counter-pieces, he thinks your's " to be considerably the finest of the three." As however the premium required only one comparative piece of Spanish wool, that of the Coronet pile was, together with mine, exhibited to the Agricultural Society, whose Committee, ignorant of the distinctive marks of the cloths, decided in favour of mine. A very accurate report of the manufacture was at the same time presented by Messrs. Yeats to the Society, and will probably be published in the next volume of their Communications. I shall, therefore, no farther anticipate the contents of that report, than by making from it the following extract. " Perhaps we cannot so fully explain to " the Committee which wool manufactured best, as by giving the exact words of " the Foreman, to whose superintendence the making of these two cloths was " entrusted. He says Dr. Parry's wool and cloth in every state work more kindly " than the Coronet."

At the same meeting of the Society, for a similar premium, Mr. Joyce, of Freshford, exhibited a piece of uniform-white Casimir, manufactured from my wool comparatively with the native Spanish pile marked R. X. S. The same Committee, unacquainted in this case, as in the former, with the origin of the respective pieces, unanimously and without hesitation, determined that from my wool to be the finest.

I have now an opportunity of communicating to the Board the actual wool-produce of my farm, at the shearing at Midsummer, 1806; previously to which I must state, that the whole land in my occupation during the preceding year, was 165 acres, of which 20 were under the plough; and that I bought for my sheep a ton and a half of oil-cake, 12 bushels of linseed, and a few bushels of grains. On the other hand, with the addition of two quarters of oats, and half as many beans, I entirely supported on the same ground three farm-horses for one year, and a fourth for half a year. I also furnished the entire hay for four coach-horses, besides the food of a useful jack-ass, and the summer-keep for two cows. Under these circumstances, the produce of wool was as follows:

		lb.	oz.
Unwashed wool from my improved breed - -		1596	3½
Washed wool of 7 half-Dorsets, 27lb. 8oz., which, if of my breed, would have been, unwashed, - - - - -	lb. oz. 31 8		
Washed wool from 20 Leicester South Downs, 77lb. which, from my breed unwashed, would have made - -	90 0	391	8
Washed wool from 60 Leicester-Ryelands, 200lb. 8oz., which, from my breed unwashed, would have been - -	270 0		
Unwashed wool from 195 lambs, yielding, if shorn, more than 1¼lb. each, - - - - -		243	12
Total		2231	7½

Now if we suppose the consumption by the other animals which I have specified, taken in connection with the extraneous food of the sheep, to equal the produce of 15 acres, the sheep land will be reduced to 150, and the return of wool per acre will be 14lb. 14oz., which, at only 3s. per lb. in the yolk throughout the fleece, will give 2l. 4s. 7½d. per acre, on land certainly not worth, on an average 26 shillings.

I am myself fully persuaded that, in the former part of this Essay, I have greatly under-rated the average weight of the fleeces of my flock, if they had been, as they are now likely to be, for a sufficient number of generations well fed. Ten rams of different ages from 4-teeth upwards, purchased of me by Mr. Birkbeck, yielded last year 97lb. or nearly 9¾lb. each, of wool in the yolk; and, of these, two gave 11lb. 15oz. each, and one, which had the finest fleece, 12lb. This weight, which I believe considerably exceeds that of any pure Merino fleece ever produced in England, and which fully equals in clean wool that of the boasted fleeces of France, was, doubtless, owing to due care and good keep. My own crops last year failed, and the arable land, which I hold, is not, in my estimation, half enough to afford proper winter sustenance for my sheep. This year, however, my flock promises to yield a larger clip of wool than last season.

The produce of this breed of sheep on my farm cannot, as I have before observed, be accurately ascertained, either as to quantity or value, till it is fully

stocked with sheep having at least 4 crosses of fine-woolled rams. In consequence of my having two years ago begun to breed from the 80 ewes above specified, all of which had a cross of the new Leicester blood, many years must elapse before such a selection can take place in my flock. Every year will however bring me somewhat nearer to the ultimate result.

Of that intelligent man and experienced farmer, Mr. Birkbeck, I have more than once had occasion to speak. It was, I think, in the year 1803, that he first began to obtain from my flock Merino-Ryeland rams, with which he has ever since annually crossed six or seven hundred South Down ewes and their descendants. The following are the observations on this subject, contained in a letter which I have this day received from him. "The fleeces of the first cross "(washed) are to the parent South Downs, as 6 to 5 in weight, and as 3 to 2 in "value per pound. Thus,

100 South Down fleeces, 2½lb. each, at 2s. = 25l.
100 First cross —— 3lb. —— at 3s. = 45l.

"So much for wool; and were it not for the air of extravagance it might give "my statement, I should add, that there is an evident improvement as to use-"fulness of form and disposition to fatten in a large proportion of individuals. "I had the courage to exhibit at Lord Somerville's shew, in March last, five ewe-"hogs from your rams, and the honour to bear away the prize from all com-"petitors, by the merit of carcase and fleece jointly. On the whole, I believe that "the improvement of the wool may go on, without detriment to the carcase, until "we shall obtain a breed of sheep with Spanish fleeces and English constitutions; "but I am also convinced that this must be the result of careful and judicious "selection."

The information contained in this report is well worthy of public attention. In the wool produce of 100 South Down sheep, from one cross only with Merino-Ryeland rams, there was 20l. increase of value, which is equal to 80l. per cent. profit; and that on a carcase, which, instead of being deteriorated, was for the most part improved by the admixture.

In order at once to exhibit the increase in point of carcase which has taken place in my own flock, as well as to afford a comparative estimate of their capacity of growth relatively to that of those which spring from a new and additional cross of the pure Merino, I may relate the following experiment.

On the 18th of September, 1805, I sent 12 of my best ewes, 2-shear and upwards, which I shall call lot 1, to a 3-shear Merino ram of a large size, but of unknown weight.

On the same day, I sent 53 ewes, lot 2, of similar age with the former, but scarcely equal to them in carcase, to my Merino-Ryeland shearling ram, No. 65, weighing 86¼lb., whose father was a pure Merino.

On the 14th of October, 30 ewes of somewhat inferior forms, lot 3, were put to my shearling Merino-Ryeland ram, No. 44, weighing 78½lb., with no nearer cross of the Merino race than his great grandfather, which was the Spanish ram of the late Marquis of Bath.

On the 16th of June, 1806, I took 2 ram-lambs from lot 1, 4 from lot 2, and 2 from lot 3; those from the first two lots being exactly 4 months old, and those from the third lot about 3 months. They weighed as follows:

		lb.
Lot 1.		
	Ram-lamb, No. 1, -	54½
	——— No. 2, -	53¼
Lot 2.		
	Ram-lamb, No. 3, -	77½
	——— No. 4, -	53½
	——— No. 5, -	52¼
	——— No. 6, -	55
Lot 3.		
	——— No. 7, -	49¾
	——— No. 8. -	51¼

They were immediately weaned, and put with 186 other lambs of both sexes, of which nearly 50 were rams, into natural grass, without any other food whatever. On the 9th of August following they were all clean-washed in arsenic water, but not shorn. August 14th, their weights were as follows:

	lb.		lb.
Lot 1.			
Lamb No. 1, -	60½	Increase in 2 months,	6
—— No. 2, -	67½	ditto	14¼
Lot 2.			
Lamb No. 3, -	96	ditto	18½

	lb.		lb.
Lamb No. 4, -	72	Increase in 2 months	$18\frac{1}{2}$
—— No. 5, -	68	ditto	$15\frac{3}{4}$
—— No. 6, -	$70\frac{1}{2}$	ditto	$15\frac{1}{2}$
Lot 3.			
Lamb No. 7, -	65	ditto	$15\frac{1}{4}$
—— No. 8, -	$67\frac{1}{2}$	ditto	$15\frac{3}{4}$

Hence it apppears,

1st, That one of my lambs from No. 65, at 6 months old, and under the most unfavourable circumstances of management, was $9\frac{1}{4}$lb. heavier than his father at 18 months.

2dly, That the average gain of 6 of my breed, in and in, in 2 months, was $16\frac{1}{2}$lb.; and that of 2, descended from at least equally good ewes by a pure Merino, only 10lb. 2oz.

3dly, That 2 of my lambs, being lot 3, were heavier at 5 months old, than the 2 from the pure Merino, which was a larger ram, at 6 months.

The superiority of form in the descendants from my cross-bred ram is extremely conspicuous.

I do not offer an experiment on so small a scale as decisive, but as it was actually made for the purpose of comparison, and, to the best of my power, fairly conducted, I give it as a subject for the reader's own comments. It is for others, who are better acquainted than myself with the capacities of our native English breeds, to determine what figure they would make in a similar experiment.

The present season has been extremely destructive to the ewes and lambs of various kinds in the neighbourhood of this city. The following is the state of my Merino-Ryeland flock to this day, May 12. One hundred and ten ewes, from 4-tooth to full 9 years old, were put in 3 lots, to 3 different rams, September 6, 1806. From these ewes came 107 lambs, 3 ewes proving barren, and there being no double lambs. Of these lambs one came dead, 2 were accidentally strangled between some palisades, and 2 died of disease. One ewe only died. Besides these 107 lambs, on the 27th of March there were yeaned 8 lambs from as many of my shearling ewes which had stolen the ram. Total surviving, 110 lambs out of 115, from 118 ewes of all ages.

While I was writing a former part of this Essay in the spring of 1806, I men-

tioned that I was attempting to give my sheep potatoes. For a considerable time the attempt was unsuccessful. Whether raw or boiled, whole or cut, they were almost wholly rejected. At length, a little salt was sprinkled on them when boiled, and they were then greedily eaten. To 152 sheep and 109 lambs, $4\frac{1}{2}$ bushels of potatoes so prepared were for about a week daily given; in consequence of which, all the sheep, though at the same time eating hay, and chaff with linseed jelly, were seized with a looseness, which proved fatal to two of my best ewes.

This year, I made a similar attempt in the month of April; giving daily, for 9 successive days, 3 bushels of boiled potatoes without salt to 136 ewes, about 126 lambs, and 29 rams and wethers, fed as before with hay, and linseed jelly with chaff. All the sheep were again affected with looseness, though not to the same extent as before. I then discontinued the boiled potatoes, and for about 10 days substituted, to the ewes and lambs only, $1\frac{1}{2}$ bushel of potatoes raw and cut in pieces, with a very small quantity of ground oats and chaff. So corrected, they seemed to agree extremely well.

I have now related to the Board all which my time and opportunities have permitted, on the subject of their premium; and I trust that they will not consider me as too minute on a topic in which almost every thing is new. Agricultural œconomy presents an unbounded, as well as unbeaten field, over which an enquirer will in vain loiter after knowledge. In order to establish truth, he must search diligently, view all objects with his own eyes, and scrutinize the qualities and order of phœnomena with a precision not inferior to that of the metaphysician or chemist.

Throughout this Essay, there are various calculations, in some of which errors may, perhaps, hereafter be discovered. This would not, indeed, be greatly wondered at, were I to state the mode, in which I have been compelled to compose the greatest part of the work. I have, however, in every instance, endeavoured to verify the result by different proofs; and I trust that no error will be found, which is sufficiently important to affect the conclusion, which has any where been deduced.

May 12, 1807.

INDEX.

D

T

ERRATA.

Page 341, line 17, dele *of which.*
344 —— 3, dele *not.*
369 —— 23, for *were*, read *was.*
389 —— 8, for *oon*, read *soon.*
—— —— 29, after *time*, add *have.*
397 —— 11, erase the stop after τας, and place it after ὀχείας.
408 —— last line, first word, read *give.*
437 —— 13, after *poor*, insert a semicolon.
441 —— 15, for *dhar*, read *hard.*
473 —— 16, for *correspond* read *corresponds.*
497 —— 17, for *I think that*, read *that I think.*
530 —— 23, for :, write ÷

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