

Practical observations on the culture of lucerne, turnips, burnet, timothy grass, and foul meadow grass, communicated by letters to Dr. Templeman ... To which is added, an appendix, containing comparative estimates of the expence and profit in drill and broadcast husbandry ... And an account of some new instruments in husbandry / [Peter Templeman].

Contributors

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P R A C T I C A L
O B S E R V A T I O N S
O N T H E

Culture of LUCERNE, TURNIPS, BUR-
NET, TIMOTHY GRASS, and FOWL
MEADOW GRASS,

COMMUNICATED BY

Letters to Dr. *Templeman*,

Secretary of the *Society* for the Encouragement
of *Arts, Manufactures, and Commerce.*

To which is added,

An A P P E N D I X,
C O N T A I N I N G

Comparative Estimates of the Expence and
Profit in DRILL and BROADCAST HUS-
BANDRY, in different Parts of *England*,
and in *Ireland.*

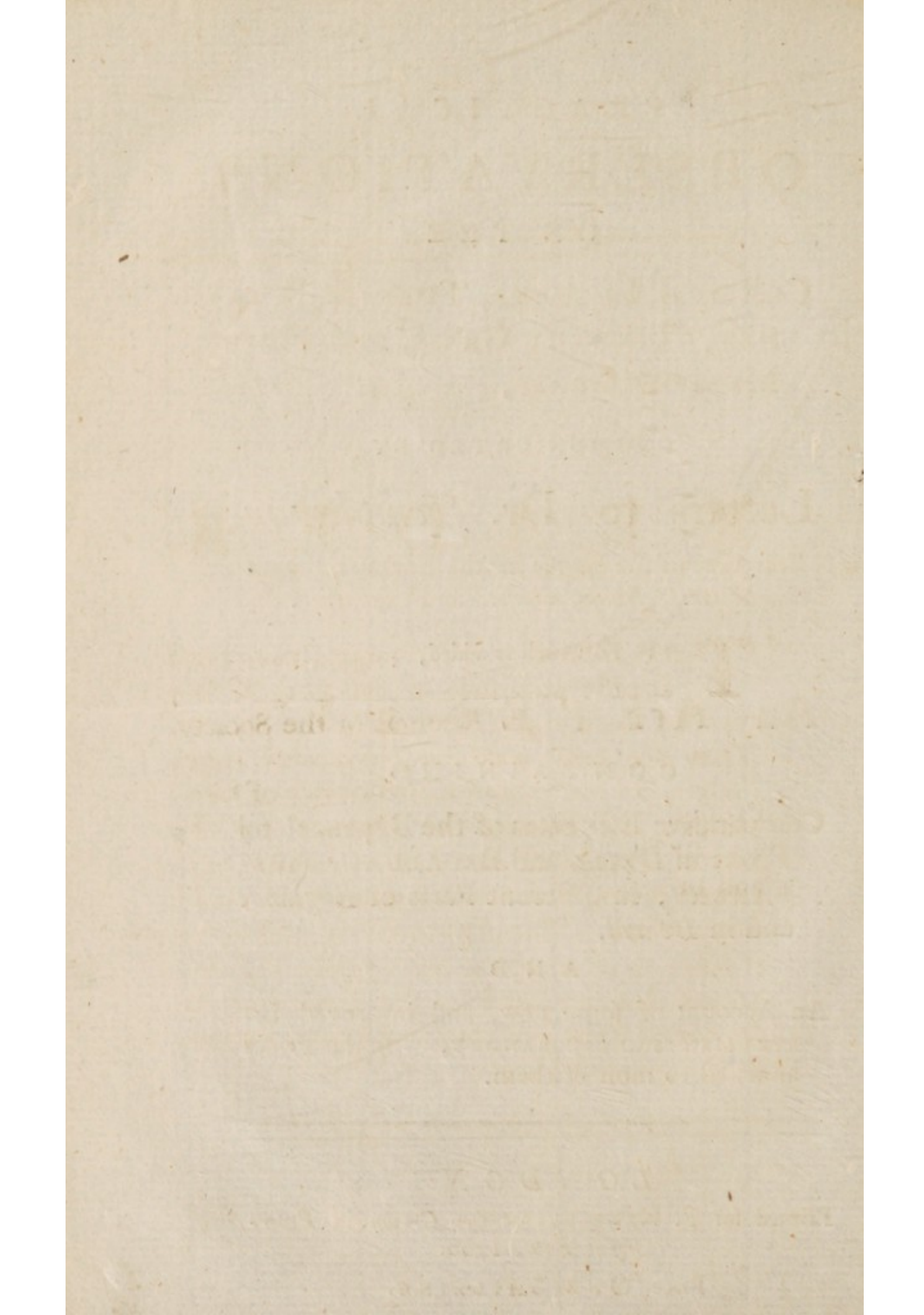
A N D

An Account of some new, and improved IN-
STRUMENTS in HUSBANDRY, with the Prices
annexed to most of them.

L O N D O N :

Printed for F. NEWBERRY, at the *Crown* in *Pater-*
noster-Row, 1766.

Price ONE SHILLING.



TO THE
R E A D E R.

THE following Observations have been already published in the *Ledger*, and most of them at the Request of the Society. They are now published, collected together, for the greater Convenience of Gentlemen; and because the Demand for the several Papers of the *Ledger*, which contained them, was much greater than could be supplied. The Appendix is added, as it tends to clear up a much agitated and important Inquiry, and as the Facts may be depended upon; for they come from Persons of the greatest Honour and Veracity.

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A
 COLLECTION of LETTERS
 ON
 AGRICULTURE,
 COMMUNICATED TO
 The SOCIETY for the ENCOURAGEMENT
 of ARTS, &c.

LETTER I.

*An Account of the Culture of Lucerne, in
 the Broad-cast and Drill.*

THE Farm on which the following Experiments were made, is a strong Clay; a soil, in the opinion of all Writers in Agriculture, the most unfriendly to *Lucerne*. Encouraged, however, by M. *Lullin de Chateauvieux*'s Experiments, the Owner was tempted to try how the *Lucerne* would succeed when treated in the manner he proposes: and in the year 1761, he sowed a Field of about three Acres with *Lucerne* in Drills, two feet asunder. During the first year, he caused it to be weeded carefully; and from the places where it grew too thick, he supplied those in which it had failed. After every weeding, he caused the

intervals to be stirred with a Horse-hoe, resembling M. *Lullin's* single Cultivator, which manifestly revived the plants.

In 1762, the plants throve greatly, being kept clean, and horse-hoe'd as in the former year; and the Society having published a Premium for a comparative trial between *Lucerne* sown in Broad-cast, and in Drills, he determined to try one part of that experiment on this field, and not to bestow on his *Lucerne* any Manure whatever, or to give it any other help than the horse-hoe.

In 1763, the plants were arrived at a size to yield so full a crop as to maintain five horses, from the middle of *May* to the end of Autumn, or about five months. These horses, though constantly worked very hard, had neither Corn or Hay given them during all this time; and yet they continued in strength and spirit, and grew fat. A horse which in *May* was so weak, and in so bad a state of health, that it was thought he could not live, soon recovered, when fed with *Lucerne*. The plants were in general between three feet and three feet and a half high, at the first and second cutting. The plants made so many shoots, and these shoots branched so much, that in three weeks after every cutting, or sometimes sooner, the intervals quite disappeared; the whole field being so equally covered, that it looked as if sown in broad-cast. *December* 1763, *January* and *February* 1764, having been uncommonly rainy, the water stood in some parts of the field; and tho' there was generally such a declivity as that it might have been carried off, he resolved to let it remain, in order to see what effect it would have on the *Lucerne*. When the

Lucerne

Lucerne, began to rise in the rest of the field, in Spring, he found that wherever the water had stood, the plants were killed. He supplied this loss by transplanting *Lucerne* from other parts; and these plants throve very well. By a continuance of the same treatment, the *Lucerne* remained in a very flourishing state: and retained a beautiful verdure and vigour, during the very great drought of this Summer, 1765. It has yielded four cuttings every year, and sometimes five.

Having observed in a root of *Lucerne* taken up in the Winter, that the Spring shoots had no connection or concern with the remains of the shoots of the preceding Summers, but proceeded from numbers of little turbercles, with which the head of the root was set very thick; it appeared evident, that the plants could not sustain any damage, though covered with a depth of earth during the Winter. This suggested a hint, that the intervals might be plowed as deep as possible early in the Winter, turning the earth on the beds; and that by letting the earth remain in this condition till Spring, the clay, or strong soil in which the *Lucerne* grew, would be mellowed, or loosened, by the Winter's frost and rain: and being harrowed smooth in *February*, the fresh lateral roots, which shoot out in the Spring, would find a fine fresh mould to extend themselves in, which must tend greatly to the benefit of the plants. This thought was confirmed by experiment: for the Spring crop is amazingly vigorous ever since this practice was followed, and the shoots though of great length, and most plentifully supplied with branches, are so strong, that no rain or wind lays them, even when they have stood to be in full bloom, as is

the case with part of the first crop; the horses not being able to consume the *Lucerne* before part of it is necessarily in bloom. Another advantage arising from this practice is, that the grass which takes root near the plants, and which cannot be otherwise destroyed but by hand-hoeing, is killed by being so long covered with the earth laid on the beds.

In 1761, a spot of ground of an exactly similar soil was inclosed for a kitchen garden; and there being part of it, which was not wanted for other use, in the Spring of 1762, it was sown with *Lucerne* in broad-cast, as a counter experiment to the former. The warmth of the garden, and the partiality of the gardener to this method, who held the field experiments very cheap, gave his *Lucerne* every advantage that could be desired. It came up well, and was kept free from weeds; but it neither grew so fast nor so high as the *Lucerne* sown in drills. This difference became much more sensible during the second and third years; for in 1764 the field *Lucerne* had got the start of it so far, that this did not rise to half the height, nor did it yield a quarter of the quantity of Fodder; so that he thought it needless to prosecute the comparison further.

Seeing so very remarkable a difference between the *Lucerne* raised in drills, and that raised in broad-cast, he resolved to try what share of this advantage might be placed to the horse-hoe, and what to the distance at which the Plants stood; which distance afforded the roots more room to extend in. With this view, in 1764, he sowed a neighbouring field in rows, two feet asunder, intending to horse-hoe one half, and to keep the other free from weeds by hand hoeing only.

The

The months of *April*, *May*, and *June* of that year were so dry, that the plants came up thin, and the clay was become so hard, that the horse-hoe could not be made use of till late in the year. Even with this disadvantage there was seen a manifest difference, in favour of the plants that were horse-hoe'd. The same difference was also observable in the Spring of this year : but the uninterrupted drought of this Summer has kept the clay so hard that the horse-hoe could not be used.

Computing the rent of the land, and the utmost expence that can attend the horse-hoeings and cuttings, it will be found, that feeding horses with *Lucerne* without any Corn, will be a great saving, when compared with the price of the hay and corn which these horses must have necessarily consumed in the same time, being kept to equally hard labour.



 LETTER II.

On the Culture of BURNET.

I Lately received a very polite letter from a member of your excellent Society, requesting me, *that as there are many people who doubt of the usefulness of Burnet, to inform him, by letter directed to you, how the Burnet, for which I obtained the Premium, has answered during the very dry Season of last Summer.* To oblige this Gentleman, and to make up the deficiency in my former account of *Burnet*, when I sent you my Certificate, is the reason why I trouble you with this.

My *Burnet*, though very green and beautiful all the Winter, made no great progress 'till the middle of *April* following, when I thought it absolutely necessary to feed it. I did so, but I did it too late, and kept my cattle upon it too long, from the middle of *April* to the 20th of *May*. This was a very great mistake; the *Burnet* plants were now headed for seed, and the stock chiefly fed upon the heads, which greatly lessened my quantity of seed, as well as retarded the growth of the plants. I turned into the field, Ewes, Lambs, and Calves, and they all fed very greedily upon the *Burnet*. From what I had heard of *M. Rocque*, I very much expected them to scour, but there was not the least appearance of it, and the cattle thrived accordingly.

The 6th of *July* I began to mow, the weather being favourable; six men and four boys thresh-
ed

ed and cleaned the seed in seven days. I had 200 bushels of very fine clean seed, as many sacks of chaff, and seven loads of hay, from a field of seven acres and a quarter.

Satisfied that 200 bushels of seed would be more than I should be able to dispose of, I was not anxious after another crop, being rather desirous of seeing what it would perform as a pasture. Accordingly, in about ten or twelve days after the field was cleared, I turned into it seven cows, two calves, and two horses; they all thrived very remarkably, and the cows gave more, and we thought a richer milk than in any other pasture; I really expected, (as *Burnet* is so strong an Aromatic) that the milk would have had a particular taste; but far otherwise, the milk, cream, and butter, were as fine, if not finer tasted, than any from the best meadows. I am satisfied, that there is no better pasture for Cows, whether milched or barren, than *Burnet*. The weather was now extremely drougthy, all our Pastures were burnt up, yet the *Burnet* flourished, and grew away, as if it had a shower every week. My stock of cows, horses and calves before-mentioned, pastured in it almost continually, 'till Michaelmas; by the middle of *November* it was grown so considerably, that I have again turned in six head of cattle, and if the weather is not severe, I am of opinion, it will maintain them till Christmas.

The *Burnet* straw, or haum, is, after the seed is separated from it, a very useful fodder for horses, cows, calves, and sheep; the chaff is of good value, if mixed with any other, however ordinary chaff. I have fed all the above mentioned stock with it promiscuously, together in one field; putting the haum into racks, and
the

the chaff into troughs, and if the haum was chopped with an engine, it would still be of much more value.

Burnet I am fully persuaded will prove a very great acquisition to husbandry on many accounts, but more particularly for the following reasons.

Burnet is a good Winter pasture, consequently it will be of great service to the Farmer as a constant crop he may depend upon, and that without any expence for seed or tillage, after the first sowing; whereas turnips are precarious and expensive, and when they fail, as particularly this year, the Farmer is very often put to great inconveniences to keep his stock.

It affords both corn and hay too. *Burnet* seed is said to be as good as oats for horses. I know they will eat it very well; judge then the value of an acre of land, which gives you at two mowings ten quarters of corn and three loads of hay.

The seed indeed is too valuable to be put to that use at present; though it multiplies so fast, that I doubt not but in a few years the horses will be fed with it.

It will bear pasturing with sheep.

It makes good butter.

It never blows or hoves cattle.

It will flourish upon poor light sandy, stoney, shaltery, or chalky land.

Burnet, after the first year, will weed itself, and be kept clean at little or no expence.

The cultivation of *Burnet* is neither hazardous nor expensive: if the land is prepared as is generally done for a crop of turneps, there is no danger of any miscarriage, and any person may be supplied with the best seed at six-pence per pound,
by

by Mr. Charles Thorp, Seedsman, in the *White-Hart-In yard, Borough.*

I make no doubt but that *Burnet* might be sown late in Spring, with oats or barley. A gentleman in my neighbourhood did so last summer, and it succeeded very well. I should think a buck-wheat season, which is sown the last of all corn, would suit it very well; but of this I have no experience, and could wish to have the experiment tried. A pea-field, drill'd in rows, and kept clean, would make an excellent season for *Burnet*, as the pea crop would come off soon enough to prepare the land with two plowings by the middle of *August*, after which time I should not chuse to sow it.

It very frequently happens, that every Farmer who sows many acres with Turneps, has several worth little or nothing; the fly, the dolphin, the black caterpillar, the dry weather, or some unknown cause, often defeating the industry and expence of the most skilful Farmer. When this happens, as it too often happens, I would by all means advise him to sow it with *Burnet*, and in *March* and *April* following, he will have a fine Pasture for his sheep and lambs.

Burnet is a native of *England*, and will certainly perfect its seed twice in one Summer; and a Farmer, with a small Plantation, may supply himself with seed of his own growth at very little or no expence: he may then be encouraged to make experiments on various seasons, without much loss or damage.

Thus, Sir, I have sent you a true account of the success of my *Burnet*, and also my opinion of it. I wish what I have said may any ways

contribute to dispel the prejudice, or inform the ignorance of my country-men. I am, Sir,

Ridley, Dec.

Your most Obedent,

10, 1765.

Humble Servant,

DAVIES LAMBE.

LETTER III.

On the Culture and Use of BURNET.

IN compliance with the advice and desire of several Gentlemen of my acquaintance, I have determined at last to send you the inclosed Certificate of my *Burnet*.

The fields contain by measurement seventeen acres, though I have only called the quantity sixteen acres, and I shall be well pleased to find myself excluded by more deserving claimants; for I thought that the Society proposed their Premiums as a Stimulus for the Farmers; but a worthy Member of your Society told me a few days ago, that they had little hopes of moving the meer Farmer to attempt experiments of this sort, but hoped, however, that Gentlemen might be induced to do it from offered Premiums of the Society, and that when they did, the neigh-

neighbouring Farmers, who could look over the hedge, would soon adopt in more general practice the experiments made by the Gentlemen, when they saw the success that attended them.

Whether my friend's reasoning is right, or not, I cannot pretend to determine; however, I shall not content myself with meerly sending you the inclosed Certificate; on the contrary, I shall endeavour to give you such an account of the Culture and *Uses of Burnet*, as, I believe, will give pleasure to the Society, if you think proper to lay it before them.

In the years 1763 and 1764, I made several experiments on *Burnet*; with a view to make myself acquainted with its manner of Vegetating, and the uses to which it might be applied: and having by this means acquired that knowledge I was desirous of attaining, I determined last year to lay down several acres with *Burnet*; nor would I content myself with doing it in any one particular method: Therefore in the beginning of *July*, 1764, I sowed about eight rod of ground with five pounds of *Rocque's Burnet* seed. Rain falling soon after the seed was sown, the plants came up very finely, and throve in such a manner, that I was tempted to plough up about an acre of ground and plant it that Autumn, in order to see what effect the Winter would have on the young plants. Accordingly on the 4th of *October* I planted them in rows, about twenty inches apart, and about fifteen inches from each other in the rows. This distance, from experiments and observations which I have made, seems to me a very proper distance. These plants took very well, and through the

C 2

Winter

Winter throve with surprising vigour. Last Spring I plowed the remainder of the field, being three Acres, and planted it in the same manner with my plants, the whole of which, notwithstanding the uncommon drought of last Summer, grew well, and the verdure of the plants was really very beautiful. No water was used; indeed it would have been a vast work in a field of that size: however, I never saw any need of it. The plants were once hoed, and stood over for seed, of which the quantity collected was not very great; but this must be attributed to the uncommon drought, for I think we had not above one shower of rain from the planting to the gathering of the seed, the whole of which amounted to about 160 pounds.

The seed being got, I was impatient to see how the cattle would take to it, as it was roundly asserted by some Gentlemen, that no cattle would eat it. Accordingly I ordered four cows and two horses to be turned into the field; the cows fed freely upon it, but the horses did not seem to like it so much at first, though in two or three days they fed well upon it. *Burnet* has strongly the taste of cucumbers, and I was fearful it might give a disagreeable taste to the milk; it therefore gave me great pleasure to find, in about four or five days, that the quantity of milk was not only much increased, but the flavour of the cream much superior to any I had ever had before, or ever tasted from cows fed upon the richest meadows. The cows and horses having fed down the field, it was hoed again, and then harrowed once over, which laid it very clean, nor could I find that the *Burnet* was at all hurt by the har-

Here let me observe to you, that I fed my horses in the stables for about five weeks with the *Burnet* straw, or rather haum, from which the seed had been threshed. These horses fed very freely, and throve much upon it, though they had only half their usual allowance of oats. However, as I would by no means secrete any circumstance that may appear unfavourable to *Burnet*, so I must tell you that I observed, when any friend called upon me, and their horses were put into the stable, that some horses eat very greedily of it, and others would not touch it. I cannot say this gave me much concern. I satisfied myself with thinking, that some horses did not know what was good for them; or to speak more seriously, I thought the novelty of the food might as much displease one horse as it pleased another; and Dr. *Templeman* knows, that there are some things which we loath as children, that we are fond of as men; and that there are some things which we as much dislike as men that are very wholesome food: but to come nearer to the point; 'tis well known some sheep and cows will not touch a turnip, yet is any one weak enough to infer from thence, that turnips are an unwholesome or an improper food for cattle? and I was lately told by a particular friend, that he had often observed, when his horses had fed for some time on the sainfoin hay, that it was some days before they would again take to meadow hay,—I should not have mentioned this circumstance of the horses, but to shew my impartiality; and I do it the more readily, as I find there are some Gentlemen who are as fond of decrying, as others can be of promoting, useful experiments in Agriculture.

Being

Being well pleased with the success that had attended my first experiment in this field, which I call four acres, I determined to proceed as I had intended in the spring of the year; accordingly as soon as the oats were got off a field of twelve acres, I ordered it to be ploughed and sown with the 160 pounds of *Burnet*-seed before mentioned. This field was sown the 26th of *August* last; and no rain falling till the 18th of *September*, the plants did not appear till the 28th of that month: however, there seems to be a good crop, and I intend as soon as they fresh up in the Spring, to have the plants set out with small hoes (such as are used for carrots and onions) to about six inches apart. and in about a week after this is done, I shall harrow it with light harrows; for from experiments which I have made, this seems to me to be the best method of managing broadcast *Burnet*. Having nothing farther to say in regard to these twelve acres, I must return to the four acre field transplanted, which having been hoed and harrowed as before-mentioned, was laid up for Winter-feed for my cows; but finding lately some Gentlemen had again asserted, that sheep in particular would sooner feed on the quick-hedges than touch the *Burnet*, I sent to a neighbouring Farmer for his flock of sheep, and having a friend with me, we followed the sheep into the field, who fell upon the *Burnet* so greedily, that we found it very necessary to send them home again.

Being much vexed at these idle tales told about so much to the prejudice of this (as it appears to me) excellent plant, I determined to put it to

as fair a trial as I possibly could. Accordingly, I ordered in four cows, which were in very good feed on natural grass, and had besides a large truss of oat-straw put in their cribs every night, notwithstanding which they gave very little milk, and indeed were almost dry. These cows, I declare, had not been in the *Burnet* above six days, before they gave much more than double the quantity of milk; nay was I to say three times the quantity, I know I should not exceed the truth. The milk is exceeding fine, and free from all bad taste; and further I must observe, that they soon began to leave half their straw in their cribs; so that they are now served with only half the quantity they had before. My land is a poor dry up-land gravel, there are millions of acres in this kingdom of better land that don't fetch two shillings and six-pence an acre. What a field therefore is here for improvement! nay, I can't but observe with amazement, the great numbers of Country Gentlemen who daily flock to this great city in pursuit of trifles, when they have such inexhaustible funds of knowledge within themselves, if they would properly make use of them; confident I am, I could point out methods of improvement that would surprisingly better their estates.

As the account I have now given you of *Burnet* may appear a little extraordinary to some of the worthy members of your Society, so I shall be far from being displeased at their even doubting what I have now said: on the contrary it will give me pleasure, provided any Gentlemen, who have such doubts, will do me the favour to
call

call at my house, and convince himself by ocular demonstration of what I have now said.

I am, Sir,

Battersea, Clapham-

Common, Jan, 6.

Your most Obedient,

Humble Servant,

CHRISTOPHER BALDWIN.

LETTER IV.

Some Observations on the Culture of BURNET.

THE public is greatly indebted to the laudable Society for the encouragment of Arts, &c. for their having excited the attention of Farmers to the estimation due to the different plants used as food for cattle. Their success with regard to *Burnet* promises great advantages, as appears by the letters lately published at the request of that Society. Neither of the authors of these letters seems, however, to have treated of the culture of that plant with a sufficient view to the principle of its being perennial. Mr. *Tull* had given the first hint of the proper culture of such plants, in his manner of raising sainfoin; but it was Mr. *Lullin de Chateaurvieux* who put the finishing hand to it, in his experiments on *Lucerne*.

I have been led into this way of thinking, by observing the remarkable difference there is between the *Burnet* planted in rows, which admit of stirring the ground between the rows, and that which grows at random, in the broadcast manner. In the first, the plants soon grow to a large size, and make quick and plentiful shoots after each cutting; while the latter, though kept clear of weeds, remain much more stunted in their growth, and make much slower and less progress after each cutting. In order to try what effect the giving of the roots more space to extend their fibres in, might have on the *Burnet*, I took up, last Spring, some plants which had remained two years in this stunted state, and transplanted them at due distances. Their speedy growth to fine large plants, sending forth strong stems well garnished with leaves, soon convinced me to what their former state was owing; a state in which the remaining plants continued.

This difference is easily accounted for by attending to the nature of the plant. *Burnet*, as well as *Lucerne*, makes shoots in proportion to the largeness of the crown of the root. The roots increase in size in proportion to the space their fibres extend themselves in, in order to collect nourishment; whereas whilst other plants take up the ground, the enlargement of these is prevented. It may be here said, that when I mention fibres, I forget that both these are tap-rooted plants. It is true, they are so; but their chief nourishment is collected by lateral fibrous roots. The tap-root enlarges in size in proportion to the space of mould in which the fibres extend; as is evident by the size of roots which grow un-

incumbered by other plants, or which grow in rows that admit the horse-hoe: whereas roots of the same age to which other plants are contiguous, or which have been sown in broadcast, do not enlarge in size. It is probable that the greater size of the roots is not owing to the depth alone to which they descend, because on enquiry, I believe it will be found, that the tap-roots descend equally deep, whether in broadcast or in drills. An instance of this was this year shewn in the Committee of Agriculture, in a root of *Lucerne*, which, in a Nursery where the plants had been sown thick in order to their being transplanted, had descended very deep in less than five months, it being about four feet long when taken up.

The number of shoots from a large root increase perhaps in the same proportion as the contents of a circle do to its diameter; *i. e.* as the squares of their diameters. It is known that a bore of three inches will give three times more water than three bores of one inch each; or nine times the quantity that a bore of one inch can. One plant then, whose crown of the root is three inches in diameter, will make as many shoots as nine plants of one in diameter.

In order to arrive at the size of one inch in diameter, a plant of *Lucerne*, for example, must stand at three inches distance from any other plant. Supposing therefore, that the *Lucerne* is planted in rows at three inches distance, and that the plants are three inches asunder in the rows, each plant takes up a space of nine square inches: consequently, nine plants take up eighty one square inches. If then the large plant makes as many shoots as the nine smaller ones, the
large

large plant, in a square of eighty one inches, is equally profitable. But as few roots of *Lucerne* arrive at one inch in diameter, when sown in broadcast, we shall perhaps be nearer the truth, if we suppose them half an inch each. In this case the root whose crown is three inches in diameter, shall yield as many shoots as thirty-six half-inch roots; and the large rooted plant standing in a square of 324 inches, will be as profitable as thirty six of the half inch rooted plants. In order to allow of more convenient culture, let us suppose that the plants are set in an oblong square, or parallelogram of fifty four inches in length, and six inches in breadth, or in the first proportion, in an oblong square of 20 inches in length and four in breadth; or in other words, let the rows be four feet six inches asunder, and let the plants stand six inches apart in the rows, as in the first case; or let there be twenty inches between the rows, and four inches between the plants, as in the latter case; there will then be room sufficient to admit of horse-hoeing, or any other improvement which may be thought wanting. Facts will, I believe, justify this reasoning, as will appear in the whole series of *Chateauxvieux's* experiments*; and also by the account given by the Gentleman who obtained the gold medal of the Society this year†.

If we apply this reasoning to *Burnet*, it will be found equally just; and by what I have ever observed, more in favour of the distant plantation: because not only the number of leaves and

* See *Chateauxvieux's* Experiment in *Mill's Husbandry*, Vol. iii.

† See the account published the *Ledger*, February the 6th. and now republished in this collection, p. 2.

stems, but also the height of the stems, and their being plentifully garnished with leaves depend more on the largeness of the roots in *Burnet* than in *Lucerne*. The not attending to the different effects of raising *Burnet* with either a considerable or a small distance between the plants, has perhaps discouraged many persons from extending, or even continuing their cultivation of this plant: for finding it difficult, in the broadcast way, to keep it clear from weeds during its infant state, and that it afterwards arrived at no considerable size, they either neglected it, or gave it up.

It is often said, that *Burnet* weeds itself. This is true when the plants have grown large, and extend their leaves on the ground for six or eight inches round, as every other plant within the shade of their leaves will then be killed: but whilst young or stunted, the case must be otherwise; for their leaves bring few in number, the weeds rise up close with the *Burnet*: and if the weed happens to be a more luxuriant plant than the *Burnet*, this last may be killed. In order to prevent this inconvenience, Mr. *Rocque* advises to mow the whole field, forgetting that many weeds may shoot with vigour equal to that of the *Burnet*, tho' others die. It will therefore be much more adviseable to plant it in rows in ground brought to very fine tilth, at such distances as at least to admit the plough or horse-hoe between them. If Gentlemen are fond of having fields full of plants, this may be obtained with greater safety by permitting the *Burnet* to drop its seed on the loose mould between the rows, after the original plants have acquired their proper size. The original plants may thus preserve their size for some years, and the possessor may please himself with the seeming

ming abundance of his *Burnet*. I doubt not but that my opinion will be justified by the accounts which the Candidates for the Society's next premium on *Burnet* must give in with their claims; for one of the conditions is, that the *Burnet* must have been kept clear of weeds for two years.

Burnet has not yet been long enough in use to make us sufficiently acquainted with its merit in fattening cattle and sheep; though very favourable inferences may be drawn from some instances. For example, some cows got into a field of *Burnet* which was then in full crop, the plants having been saved for seed. They eat greedily of it for near an hour, and then returned into the field from whence they had come. They returned again on the following days, and their eating of it was constantly attended with the same satiety in nearly the same time, as long as they had a full bite. I have been informed that sheep which had been sent into a field of *Burnet* were observed to lie down much more than they usually do in common pastures; probably on account of the same satiety, arising from the richness of its juices. Independent of fattening, I am persuaded that the Winter and Spring feeding which it will yield sheep, will render *Burnet* one of the greatest acquisitions that has been made in agriculture for some ages. This acquisition becomes the more valuable now, when there is a general complaint that land is surfeited with turnips and clover; for the crops of both these, especially the latter, fall short of what they used to be, and yet no other visible cause can be assigned.

Burnet has an advantage over turnips, which may often greatly enhance its value in the Spring; this is, that it is much more proof against severe frosts than turnips are. I have heard it observed by a very judicious farmer, that when the degree of frost was such as to sink *Fahrenheit's* Thermometer about fifteen degrees below freezing, the turnips were totally destroyed, being reduced to a putrid mass on a thaw. This, added to its constant vegetation on every return of mild weather, renders *Burnet* a real treasure.

I may likewise mention another advantage of *Burnet*, which I have not observed in any other plant. It is, that, when eaten down, the farther progress of the plant is not by an elongation of the blades fed upon, as in grasses; but from fresh blades which daily spring from the root; I may almost say daily, as the former blades are eaten off. By this quality, the plant is not liable to be exhausted, or as it is usually expressed, to bleed so as to weaken, or rob it of its juices.

Having mentioned the probability of *Burnet* becoming so useful a food for sheep, a thought occurs to me, which I wish some Gentleman residing in the country would ascertain by experiment. Our English pastures afford a food for sheep so well suited to the production of good wool, that from this source, our national staple and wealth arise. Our wool was famed for its goodness long before the manufacture of cloth was established here; when, as history informs us, the duty on the exportation of wool was a considerable article in the King's revenue. The effect that *Burnet* may have on the wool of sheep fed with it becomes therefore a matter of
the

the greatest importance ; for if it has the least ill effect on the wool, no consideration should induce us to suffer it to become a food for them.

Having said so much of *Burnet*, as a food for cattle and sheep, let me take this opportunity of communicating to the Public an information given to the Society for the encouragement of Arts, &c. by a Candidate for a premium on *Lucerne*, living in the neighbourhood of a sea-port lately much resorted to for the convenience of drinking the salt-water. He fed some cows on *Lucerne*, and sold their milk to the company resident there during the Summer. Towards the close of the season, the cows became so fat, that he thought it a pity to lose the sale of them, whilst in so good a state for the butcher. He accordingly sold one, whose flesh proved in so fine an order, so beautifully marbled, and so well relished, that those who eat of the beef desired to be particularly informed when the butcher sold more beef fed on the same farm. The second proved like the first ; and the flesh might have been sold at a considerably advanced price. I have been informed, that the like advantages have attended the flesh of other creatures fed on *Lucerne*, in regard to fatness and relish.

LETTER V.

On the advantages of the Drill Husbandry in the Culture of Turnips.

THE generous method you have taken to promote useful knowledge must give every lover of his country the greatest pleasure, and incline him to do all in his power to increase it; 'tis with this view, and by the persuasion of many friends, I presume to lay before you the following lines, hoping they may give you some satisfaction in respect to the difference betwixt the old and new Husbandry.

I began Husbandry in the year 1742, had always an inclination to drilling, and was at much trouble and expence in getting one instrument after another made for the purpose; but was often disappointed, and for some years was forced to lay by the thoughts of it. About eight years since a Gentleman lent me Mr. *Tull's* Treatise; I then got some new instruments made, which sowed very regularly, and since that time have sowed all my corn in rows. — Several closes I ploughed in six furrow ridges, and sowed with three rows of wheat, ploughing the intervals with a small furl, drawn by one horse, and made it fit for wheat the next year; it generally took one third of the common quantity of seed, and in two years it yielded more than half as much again

again as the best crops in the common way did in one year; which, considering the small expence of seed and labour, was some advantage, though not very great; but then it left the ground in very good order for the next crop of Spring corn. I kept one close, about two acres, four years to Wheat in the same method, but the two last years did not answer to the two first, which makes me think Mr. *Tull* wrong when he says, that plants of different natures are nourished by the same sort of food. I could give an account of the exact quantity produced in each year, but it would be tedious: upon the whole I believe this method of sowing wheat will be of no advantage except in poor strong clays, where I apprehend it must exceed all others. But there are a few inconveniencies attending it; frequent ploughing the intervals is apt to make the wheat shoot fresh ears, which do not ripen with the others; and if any of the full ears when near ripe do but touch the fresh ploughed earth, ever so little wet will make them sprout, and these will injure the whole crop; and I find it impossible to keep all up, as the rows are at so great a distance. But my method of drilling in the open fields, and which I intend to follow, is to put five rows about eight inches apart, on a ridge about five feet in breadth. This takes but two-thirds of the seed sowed in the common way, and has always produced a better crop than the lands on each side of mine; this my neighbours are now convinced of, and several of them have drilled their wheat this season: Our soil, for the most part, is a deep heavy sand.

I apprehend the principal advantage in drilling wheat is placing it at a proper depth, which I think is within two inches or thereabouts. I

have observed, that the first motion of the wheat is by some roots, which in a little time run very deep; then it shoots up its blade; next it begins to form a head, about an inch under ground, from which come (very soon in a mild season) the second and third blades; and after this it begins to shoot fresh roots and branches from this same head, till in time it grows very large, especially in a fruitful soil and a good season; and it keeps on shooting fresh roots all the growing season: now if the corn is too deep, and a severe frost happens while this head is forming, the plant is quite destroyed: but if it lies shallow it shoots a new blade from the corn, and goes on in its operations as before; this was the case in 1763, a severe frost happened in the night of the 13th of *February*, which destroyed a good deal of wheat; so that some which lay deepest was ploughed up, and sown with other seed in the Spring. Last year multitudes of plants were killed in the same manner, and brought the crop very thin. In short, I am very certain, that whoever will make their observations will find that what I have said is the truth; that the shallowest corn will flourish sooner and better, and from thence will be led to see the advantage of drilling wheat.

But although I intend leaving Mr. *Tull's* method of sowing wheat, yet I hope always to follow it in Beans and Turnips.

My beans I have sown these four years in double rows, about ten inches a part, and about two feet intervals. These I plough from and to the beans, when about six inches high; this is done with a little Sull drawn by one horse, and will plough three acres in a day. This method hath succeeded so well, that many are come
into

into it; although the Farmers have always an aversion to new methods of managing; we sow but one-third of the seed, and have a much better crop, as is allowed by all.

As for *Turnips*, all my neighbours will allow the drill to beat every thing. I sow a double row about eight inches wide, on a ridge about five feet, and though I did not sow this year till *August*, I have *Turnips* two feet round, after wheat. I have given them but one ploughing as yet, besides hoeing them out at proper distances. I believe all will acknowledge I have double the crop in weight with any sown in the old way. I left four intervals unploughed in one close, to see the difference, and it is very surprising. One of my neighbours was prevailed on to sow a few rows in a piece he was sowing, and let my man plough them. The difference is so great that he is become an advocate for the Drill Husbandry; indeed I do believe that it will soon make its way through all the prejudices of the old Farmers to the contrary; especially as we have a Drill invented by an ingenious Carpenter, with which several Farmers have sown Beans, Pease, Turnips and Wheat, and it answers exceedingly.

Thus I have laid before you the result of my experiments and observations for more than twenty years, as far as they relate to your proposals; and hope it may meet with your approbation. And if at any time I can be of any service to my fellow creatures it will be the greatest pleasure to me; who am,

Your most obedient,

South Petherton,
Nov. 23, 1765.

Humble servant,

JOHN WILLY.
L E T.

L E T T E R VI.

*On the Advantages of the Drill Husbandry in
the Culture of TURNIPS, continued.*

YOURS of the 4th Instant I received, and with pleasure give my answer as follows: I assure you, that for these seventeen or eighteen years past, I have been striving to improve a crop of *Turnips*—Before this, nothing was known or aimed at hereabouts, but sowing in the common way, one pound of seed on an acre; and then come thick, come thin, weeds and all grew together, till the sheep were turned in to eat the crop as it was, and generally it was very poor.

The first improvement I made was by *Ellis's* direction, to drag them well with heavy harrows till they were got pretty thin, by which method I soon got better crops than any about me. But then I sowed double the quantity of seed, that I might have sufficient stock of plants for my after husbandry. My neighbours were soon convinced of the advantage of this, and followed my example, which is now the common practice. After this, finding the thinnest was best, I got some hoed: this I found still better, but very expensive, our people not being used to it. I tried Mr. *Ellis's* receipt to prevent the fly from destroying the young plants, but my ploughmen refused to sow the seed when mixed with sulphur. I then invented a long box, made full of holes, for the seed to fall through, and fastened it to two wheels so as to keep it above ground;

ground; this went so light that a boy could draw it, and sowed the seed very regularly. I shewed this to a friend of mine, (Mr. *Joseph Pittfield*, of *Sidland* in *Dorset*) who had one made immediately; and soon made an improvement on it, by having the holes made in rows about a foot asunder. Finding that the plants could be thinned and cleared at a much less expence, I followed this method of sowing for myself, as did some of my neighbours, for some years, and with a deal of satisfaction. On reading Mr. *Tull*, a few years since, I was willing to try what stirring the ground deeper would do; and being resolved to try the Drill Husbandry in corn likewise, I had a small Sull made, with which one horse will plough more than two acres in a day, first turning four or five inches deep from the plants and then back to them again: we generally sow *Turnips* after Wheat, Pease and Flax, and my method is to plough the ground into six furrow ridges, which with the open furrow makes about five feet in breadth. On such a ridge I sow (out of a short box) two rows of seed, though sometimes but one, and harrow it in with a very light harrow. When they have four or five leaves I get them thinned, and give them a ploughing; and sometime after, when they begin to kern, I have them thinned and cleaned again: and this is all the Husbandry I have hitherto bestowed, and all I think is necessary, as we don't sow till late; the cost of which is about three shillings *per* acre.

I have sown some betwixt rows of beans, and they answered very well: when the beans were pulled, I had the plants thinned and cleaned, and the earth ploughed betwixt the rows.

The

The first I sowed last year was a small piece about half an acre, where hemp failed: I had the ground ridged up, and sowed with two rows of seed, and managed, as I said before: indeed the ground was dunged for the hemp. This was sown the latter end of *July*, but did not come up till the middle of *August*, for the want of rain. I pulled them before *Christmas*, and had fifteen putt loads, which every one will acknowledge to be a good crop; I believe double a common one: and though the rows were four feet apart, the leaves touched each other. The next I sowed was after wheat, about the middle of *August*: when the wheat was carried off, I had the ground ploughed into ridges where the old furrows were, and sowed one row of seed on each ridge: these cost but little in thinning and cleaning, and once ploughing, and were a very good crop: the largest of them was more than two feet round and weighed above six pound: indeed towards the hedges they were much smaller; I had fifteen putt loads *per* acre, tho' the ground had borne three crops since it was dunged. Another piece of two acres I sowed after pease, in double rows; but not till the latter end of *August*: I had the ground ridged up, and when the plants were fit, I had them thinned and cleaned as usual, but left four ridges for ploughing to see the difference; and truly it was surprizing: those that were ploughed were more than three times as large, though they had all the same Husbandry, except ploughing. They are as good a crop as the wheat stubble, though sown later, which makes me think double rows are best: our soil is mostly heavy good sand.

Thus,

Thus, Sir, I have given you the best account I can, in which I fear I have been too tedious; but I hope it will meet with a candid reception, and that every thing amiss will be overlooked or blotted out, which will be gratefully acknowledged by,

S I R,

South Pether-
ton, Feb. 8,
1766.

Your most humble Servant,

JOHN WILLY.

LETTER VII.

Observations on TIMOTHY GRASS, *and* FOWL MEADOW GRASS.

THE favourable reception you gave my observations on the culture of *Lucerne* and *Burnet*, encourages me to trouble you with some hints relating to two Grasses not yet sufficiently known to Farmers. The Grasses I mean are *Timothy Grass*, and *Fowl Meadow Grass*, called *Bird Grass* by Mr. Rocque, to whom the Public is considerably indebted for their introduction into *Britain*. Had it not been for his careful culture of them, the generous intentions of the late Reverend Doctor *Eliot* of *New-England**,

* See *Mills's Husbandry*, Vol. III.

that friend of mankind, had been frustrated; and *England* had at least for some years been deprived of the very great advantages which will probably arise from them.

The first of these, the *Timothy Grass*, is in appearance a coarse Grass, very little promising to be a pasture agreeable to cattle. Indeed its appearance so strongly prejudiced many against it, that it would have been at once condemned to neglect, had it not been rescued by the enterprizing disposition of Mr. *Rocque*, who had sown a considerable spot of ground with the seed first sent from *America*; yet the fact is, that, whilst in sap, it is more agreeable to horses and cattle than any other Grass has been observed to be. Mr. *Rocque*'s horse soon gave him a convincing proof of this; for having got loose, he left very fine *Lucerne*, and the moment he reached the *Timothy Grass*, instead of ranging about, as usual with horses, he eat clean before him.

Deer, which are very nice in their food, are so fond of it, that, as I am well assured by gentlemen from *North America*, they sow *Timothy Grass* there on the skirts of their corn land near the woods; in order to keep the deer from eating their corn; the *Timothy Grass* being much more agreeable to them than even corn.

The dry hay of the *Timothy Grass* is exceedingly agreeable to cattle, as appears from a remarkable instance mentioned in a conversation in the Society for the Encouragements of Arts, &c. A worthy Husbandman*, who had him-

* *Et virum bonum cum laudabant, ita laudabant, bonum agricolam, bonumque colonum. Amplissime laudari existimabatur, qui ita laudabatur.*

self often experienced how fond his cows and horses were of it, carried a friend into the field, that he might have ocular demonstration of it. The Husbandman took a tuft of dry *Timothy Hay* in his hand, and as soon as one of the cows saw it, she came instantly to feed on it, though there was plenty of good Grass under foot. Another cow soon followed the first, and both eat greedily of it: but each of them refused to eat the hay of common Grass, which happened to be mixed with it. So fond were the horses and cows of this hay, that they would follow a person * having some of it in his hand, as readily as they would one who carried corn for them.

Shall we impute the peculiar relish of this hay, to a cause similar to that to which *Pliny* imputes the fertility of the soil of *Italy* during the virtuous states of the *Roman* commonwealth?

“ *Quænam ergo tantæ ubertatis causa erat? Ipsorum tunc manibus imperatorum colebantur agri*
 “ *(ut fas est credere) gaudente terra vomere la-*
 “ *reato, et triumphali aratore: sive illi eadem cura*
 “ *semina tractabant, qua bella, eademque diligen-*
 “ *tia arva disponebant, qua castra: sive honestis*
 “ *manibus omnia lætius proveniunt, quoniam et*
 “ *curiosius sunt.* *Plinii Historia Naturalis, lib.*
 “ *xviii. cap. 3.*

A very great advantage attending the *Timothy Grass* is, that it thrives well in such wet marshy land as will scarcely yield any other good Grass: and here, its numerous and matted roots make so strong a sward, that land which was before a loose mire, shall become so firm as to

* The person here alluded to, is one who had a very considerable command both in *Germany* and at the *Havannah*.

bear cattle and even carriages without their sinking into it.

It is almost needless to add, that in order to sow *Timothy Grass* seed in such marshy land, it must be drained, and then all the inequalities common in such land, as well as the strong matted roots of coarse Grass should be taken up and burnt. The land being then ploughed and laid smooth, the ashes should be spread upon it, and the seed may be sown early in the autumn; or rather, the plants should be raised in a nursery, and set in it at six or eight inches distance, every way, from each other. This Grass will also thrive well on a clay bottom, where water is apt to stagnate in rainy seasons.

The *Fowl Meadow Grass* delights in a moist bottom, but a soil richer than the former requires, such as flat low meadows. It will grow on meadows which are dryer, but not yield so great an increase. Its appearance indicates this to be a valuable Grass. It has a property, which so far as I know, is peculiar to itself. All other Grasses wither into a dry straw as soon as they have perfected their feeds: but this Grass, as soon as its seed begins to ripen, shoots out fresh stems from every joint. These stems grow quickly to a considerable length, and run also to seed. The whole plant continues in sap after the first seed is even dropped, owing probably to the circulation of the juices kept up by these young stems; and the hay made of it at this time looks as green, and is as soft as the hay of other Grasses which have been cut down at a proper season. There is not only a shoot upwards from every joint, but the joint also takes root, if it touches the earth. The Reverend Dr. *Elliot* was the first who mentioned this singularity

gularity in the *Fowl Meadow Grass*; and at the same time pointed out a considerable advantage attending it, viz. that if, on account of rain or any other necessary delay, this Grass stands beyond the proper time of cutting it, the Farmer is no loser, because this Grass does not rot or wither, as other Grasses would do; and the fresh shoots from the joints make such an additional weight as proves a full recompence for the longer time the Grass has stood.

The condition which the Society for the Encouragement of Arts, &c. have annexed to their Premium for Grass, 'of the Grasses being sown "in drills,"' will be attended with this advantage, that Husbandmen will see the size to which different Grasses will grow, when their roots have sufficient room in which they can extend themselves. The advantage of being thus planted separately appears in no Grass more remarkably than in *Timothy* and *Fowl Meadow Grasses*. A very ingenious and worthy Husbandman, who was led by accident to transplant some of each of these Grasses, was so much pleased with his success, that he now intends to extend his culture of these plants in this manner: and whoever examines them at Mr. *Rocque's*, will instantly perceive how much the transplanted *Timothy Grass* has the advantage of that sown in Broadcast. It will at first be a matter of great difficulty to prevail on Farmers to execute any plantation at the great expence and trouble of planting a field of grass in single plants; but so far as I have yet seen I dare prognosticate, that in less than three years, the superior advantage of the transplanted crop will manifestly justify my opinion.

When the *Timothy* and *Fowl Meadow* Grasses are intended to be cultivated by transplanting them, the seeds should be sown in a nursery; and the land in which they are to be planted, being in order, the plants should be set at six or eight inches distance every way; the distances being proportioned to the richness of the soil. Those Grasses tiller or stalk so much, that in one year the ground will be sufficiently covered with plants. Spring or Autumn are proper seasons for transplanting; but rather the latter, because the plants having taken good root during the Winter, will be enabled to make vigorous shoots in the Spring, and will soon increase into large tufts of Grass.

The *Timothy* Grass will grow to the height of three or four feet high. I have been assured by a Gentleman, that he has seen it between five and six feet high in *Virginia*. If it is cut down before the seed ripens, it will soon shoot anew, and yield a good second crop. The *Fowl Meadow* Grass grows to the height of about three feet, and will ripen its seed twice in a season: we may therefore infer, that it may be cut for hay thrice in a season. It is not an early Grass; but as soon as it begins to shoot, it makes up for that loss by its speedy growth. During the drought of last Summer, the second crop made a surprizingly quick progress. Its not being an early Grass is perhaps no loss; for as it delights in rather moist meadows, the ground might be poached, were cattle tempted to go early to feed on it.

If, from some imperfection in the soil, the plants of either of these Grasses do not fill the ground sufficiently, they may be let run to seed,
which

which falling in the vacant spaces, soon supply the want. So far as we have yet observed in this country, these self sown plants do not arrive at the size of the parent plants, which were set at due distances: and this affords good reason to think, that if the seed was sown in broad-cast, and the plants came up thick, they would in the same manner be stunted in their growth.

Whatever expence may attend the transplanting, yet it seems in some degree necessary for the *Fowl Meadow Grass*, because the growing of the seed is very uncertain, as appears by every experiment yet made in *England*. I cannot assign any other reason for this uncertainty, but the difficulty of hitting the proper depth at which the seed should be buried. By its readily growing when it falls from the plant, it seems as if this seed should be very little covered with earth. It is hence necessary, that the land on which it is sown should be very fine, and in good order. The *Timothy Grass* seed grows much more freely than the former.

The success of the *Timothy Grass*, when sown alone, demonstrates the utility of sowing the seeds of each Grass separately, in order to form a just estimate of their comparative values: for though this Grass is a native of *England*, being a species of the Fox-tail; it has hitherto been rather neglected than cultivated, even though nature has pointed it out as an useful plant in wet meadows, by its early verdure and growth. I make no doubt but that the practice of raising Grasses separately, will bring other no less valuable Grasses to light.

I shall close this letter by recommending it to Husbandmen, who desire to improve their pastures, to examine what plants in common pastures are so constantly eaten down by the creatures feeding there, as to be kept from running to seed; for they may presume that such plants are agreeable to either the sheep or cattle fed there: or they may attentively remark, what plants each kind of animal feeds upon by choice, or preference, on being first turned into a fresh pasture. An inquiry of this kind may point out some plants, at present little thought of, as articles of pasture which may be selected, and suited to the natures of different soils, and to the different creatures intended to be fed with them. I shall just mention two plants, *Mil-foil* or *Yarrow*, and the *Narrow-leaved Plantain*, which some Farmers have found very agreeable to sheep and cattle, and which promise success on dry light soils, because they strike deep roots.

APPEN-

A P P E N D I X

CONTAINING THE

A D V A N T A G E S

O F T H E

Drilling and Horse-hoeing TILLAGE,

A B O V E T H E

Broad - cast T I L L A G E ;

Extracted from the Accounts of the EXPERI-
MENTS sent to the Society of Arts, &c.

A L S O,

A COMPARATIVE CALCULATION

O F

E X P E N C E and P R O F I T,

B E T W E E N T H E

Drill and the Common HUSBANDRY.

Taken from Mr. BAKER's Report to the *Dublin* So-
ciety of his EXPERIMENTS in Agriculture for the
Year 1765, published by Order of the Society.

L I K E W I S E

An Account of the INSTRUMENTS of HUSBANDRY,
made in the New Factory at *Laughlinstown*, in the
County of *Kildare*, in *Ireland*.

APPENDIX

CONTAINING THE

ADVANTAGES

OF THE

Drilling and Hot-Rolling Process

ABOVE THE

Rolling Process

Extracted from the Accounts of the Society of Arts, &c.

ALSO

A COMPARATIVE CALCULATION

OF THE EXPENSE AND PROFIT

BETWEEN THE

Drill and the Common Husbandry.

Taken from Mr. Baker's Report to the Dublin Society of the Advantages of Agriculture for the Year 1795, published by Order of the Society.

ALSO

An Account of the Experiments of Husbandry made in the New Method of Agriculture, in the County of Dublin, in 1794.

THE
ADVANTAGE
OF THE
Drilling and Horse-hoeing TILLAGE,
ABOVE THE
Broad-cast TILLAGE.

THE Manner and Expence of cultivating Lands for Corn in several Counties in *England* being materially different, 'tis thought proper to prefix to these Calculations of the comparative Profits arising from the Broad-cast, and from the Drilling and Horse-hoeing Tillage in *Cumberland* and *Yorkshire*, an Account, as well of the Prices of Labour, &c. as of the Manner in which each kind of Tillage is practised in these several Counties: To the End that Farmers, who are the Persons more immediately interested, may have every Circumstance exposed to their View that may the better enable them to form their Judgments on the following Estimate.

The Prices of Labour, &c.
In CUMBERLAND.

	s.	d.
Ploughing <i>per</i> Acre	3	6
Manure, <i>per</i> One Horse Cart load	0	4
Lime <i>per</i> Bushel (<i>Winchester</i>)	0	2
Hire of Man and One Horse Cart <i>per</i> Day	1	10
Ditto of a Labourer <i>per</i> Day	0	10
Horse-hoeing <i>per</i> Acre drilled	1	2
Rent of Land <i>per</i> Acre	8	0
Harrowing <i>per</i> Acre	0	6
Wheat <i>per</i> Bushel	4	0

The Kind of Soil on which the Experiments were made,
In CUMBERLAND.

A heavy moist Soil on a Clay Bottom, rather too stiff for Barley.

The Broad-cast Tillage of One Acre of Land,
In CUMBERLAND.

N. B. The Land on which the Experiments were made in this County, were ploughed out of Lea, and bore a Crop of Oats.

The First Year for TURNIPS.

	Expences.		
	l.	s.	d.
Three Ploughings with two Horses, the First in <i>March</i> , Second in <i>May</i> , Third in <i>June</i>	0	10	6
60 One-Horse Cart Loads of Manure	1	0	0
90 Bushels (<i>Winchester</i>) of Lime	0	15	0
Six Days Work of Man and Horse leading the Manure, and two Ditto the Lime	0	14	8
Two Days Work of a Labourer spreading the Manure	0	1	8
Seed and Sowing	0	2	0
Three Harrowings	0	1	6
Total Expence the First Year	3	5	4

N. B. In the above, as well as in all the following Calculations, the Expence of Reaping, Threshing, and sending to Market, is omitted; it being countervailed by the Price or Value of the Straw, (according to General Estimation) which last is likewise omitted in the Computation of the Value of the Crops.

The Value of the Crop of Turnips computed 3l.

The

The Prices of Labour, &c.
In YORKSHIRE.

	s.	d.
Ploughing <i>per</i> Acre	4	0
Manure <i>per</i> Load	2	6
Hoeing an Acre of Turnips in Broadcast, during a Season	6	0
Handhoeing <i>per</i> Acre drilled	2	6
Horsehoeing ditto	1	0
Drilling <i>per</i> Acre	0	6
Rent of Load	15	0

The Kind of Soil on which the Experiments were made,
In YORKSHIRE.

Inclining to a Hazel Mould but light and dry.

The Broad-cast Tillage of One Acre of Land,
In YORKSHIRE.

The First Year for TURNIPS.

	Expences.
	l. s. d.
Four Ploughings	0 16 0
Harrowing and Seed	0 2 0
Hoeing the Turnips	0 6 0
15 Load of Dung	1 17 6
Total Expence	3 6 0

Value of the Crop of Turnips 2l.

*The Broad-cast Tillage of One Acre of Land,
In CUMBERLAND.*

The Second Year for FALLOW, and the Third Year
for WHEAT.

			Expences.		
			l.	s.	d.
Four Ploughings	—	—	0	14	0
Four Harrowings and Sowing	—	—	0	2	6
Seed Wheat	—	—	0	12	0
Total Expence			1	8	6

The Value of the Crop, *viz.*

3 Quarters of Wheat at 4s. *per* Bushel 4l. 16s.

N. B. In this County the Broad-cast Tillage does not admit a fourth Year's Crop without a considerable Loss: Therefore after the Third Year the Land is again manured, and the same Process repeated for three Years more, and so on from three Years to three Years.

Note also, 24 Bushels (in *Cumberland*) make a Quarter: But in *Yorkshire* eight Bushels make a Quarter, and four Pecks, or nine Gallons make a Bushel. So that the Bushel used in *Cumberland* is but one Third of that used in *Yorkshire*.

*The Broad-cast Tillage of One Acre of Land,
In YORKSHIRE.*

The Second Year for BARLEY.

	Expences.
	l. s. d.
Two Plowings and Harrowings —	0 10 0
Three Bushels of Seed Barley and Weeding —	0 8 0
Total Expence	0 18 0

Value of the Crop of Barley, *viz.*
Four Quarters at 18s. *per* Quarter, 3l. 12s.

The Third Year for CLOVER.

14 Pounds Wt. of Clover Seed —	0 4 0
Value of Two Crops Clover, 1l. 10s.	

The Fourth Year for WHEAT.

One Plowing and Harrowing —	0 7 0
Three Bushels of Seed and Weeding —	0 16 0
Total Expence	1 3 0

Value of the Crop of Wheat, *viz.*
Three Quarters at 1l. 16s. *per* Quarter 5l. 8s
N. B. In this Kind of Tillage the Land never lies Fal-
low: And after the fourth Year, the same Process is repeat-
ed for four Years more, and so on.

The Drilling and Horse-hoeing Tillage of One Acre of Land in CUMBERLAND.

N. B. The Land on which the Experiments were made in this County were first ploughed out of Lea, and bore a Crop of Oats.

The first Year for TURNIPS.

	Expences.		
	l.	s.	d.
Three Ploughings with two Horses, viz. the First in <i>March</i> , Second in <i>May</i> , Third in <i>June</i>	0	10	6
30 One-horse Cart Loads of Manure —	0	10	0
45 Bushels (<i>Winchester</i>) of Lime — —	0	7	6
Three Days Work of a Man and Horse leading the Manure, and One ditto the Lime —	0	7	4
One Day's Work of a Labourer spreading ditto	0	0	10
Seed — — —	0	0	6
Harrowing and Drilling — —	0	1	6
Three Horse-hoeings, each equal to one-third of an Acre — — —	0	3	6
Total Expence	2	1	8
Value of the Crop of Turnips 2l. 10s.			

The Second Year for BARLEY.

Two Ploughings, viz. the First in <i>March</i> , and the Second in <i>April</i> or <i>May</i> — —	0	7	0
Seed Barley, viz. 1 Bushel (<i>Winchester</i>) —	0	2	0
Harrowing and Drilling — —	0	1	6
Three Horse-hoeings — — —	0	3	0
Total Expence	0	14	0
Value of the Crop of Barley 1l. 16s.			

The Third Year for WHEAT.

One Ploughing before <i>Michaelmas</i> —	0	3	6
Seed Wheat — — —	0	3	6
Harrowing and Drilling — —	0	1	0
Five Horse-hoeings — — —	0	5	10
Total Expence	0	13	10
Value of the Crop of Wheat, viz. 15 Bush. 3l.			

N. B. The fourth Year a second Crop of Barley, and the fifth Year a second Crop of Wheat at the like Expence, and with like Profit, and then after the fifth Year the whole Process is repeated. The Ridges are formed five Feet and half wide, and a treble Row of Drills seven Inches asunder, on the Top of each Ridge.

The

*The Drilling and Horsehoeing Tillage of One
Acre of Land in YORKSHIRE.*

For BARLEY.

	Expences.		
	l.	s.	d.
Two Ploughings, viz. the first in <i>Autumn</i> , and the second in <i>Spring</i>	—	—	—
Seed Barley, viz. One Bushel or four Pecks	0	8	0
Three Horsehoeings, viz. on the 30th of <i>May</i> , 7th of <i>June</i> , and the Beginning of <i>July</i>	0	2	1½
One Handhoeing on the 8th <i>June</i>	0	3	0
	0	2	6
Total Expence annually	—	—	—
	0	15	7½
Value of the Crop, viz. 3 Qrs. 6 Bush. 2 Pecks, at 18s. per Qr. 3l. 8s. 7½ d.			

For WHEAT.

Two Ploughings	—	—	—
Seed Wheat, viz. One Bushel or four Pecks	0	8	0
Three Horsehoeings	0	4	4
One Handhoeing	0	3	0
	0	2	6
Total annual Expence	—	—	—
	0	17	10

Value of the Crop of Wheat, viz. 2 Qrs.
at 1l. 16s. per Qr. 3l. 12s.

N. B. The Ridges are here formed four Feet and a Half wide: And a double Row of Seed, Ten Inches asunder, drilled on the Top of each Ridge: The Intervals for Horsehoeing being thus Three Feet Eight Inches. The same Process, and the same Expence is repeated annually: And a Piece of Ground in *Yorkshire*, under this Method of Tillage, had yielded the Eighth successive Crop, viz. Four of Barley, and Four of Wheat, at the Time the Account was sent to the Society, of the Values above specified, without ever having had any Manure bestowed upon it, and without shewing any Sign of Impoverishment, being then, to all Appearance, in full Heart.

An Estimate of the Advantage of the Drilling and Horse-hoeing Tillage, above the Broad cast Tillage, as both are practised in CUMBERLAND and YORKSHIRE.

In order to ascertain the proper Method of Calculation, whereby to arrive at a decisive Estimate of the comparative Profits from the two Kinds of Tillage; it becomes in some Measure expedient here to insert an Abstract of two Experiments, contained in the Accounts mentioned in the Title Page: And the rather that Experiments of this Kind, coming so properly authorized to the Society, ought not to remain in obscurity. These Experiments were made to prove the Difference of the Acreable Produce, and the Difference of the Rate of Increase from the Seed sown as well in Broad-cast, as in various Forms of Drilling

In YORKSHIRE.

Quantity of Seed sown on One Acre.

		Pecks.	Prod.	Rate of Increase.
A. D. 1763.	In Broad-cast	- 10	178	Seventeen-fold.
	In equidistant Drills	- 6	194	Thirty-two-fold.
	In double Drills, 11 Inch. asunder, and 4 Feet 10 Inches Interval	- 3	102	Thirty-four-fold.
	In treble Drills 7 Inches asunder, and 4 Feet 3 Inches Interval	- 2	100	Fifty-fold.

Quantity of Seed sown on One Acre.

		Pks.	Prod.	Rate of Increase.
A. D. 1763.	In Broad-cast (Barley)	- 9	137	Fifteen-fold.
	In equidistant Drills	- 8	144	Eighteen-fold.
	In double Drills 10 Inch. distant, and 3 Feet 8 Inches Interval.	- 4	136	Thirty-four-fold.

N. B. This last is that preferred in the *Yorkshire* Drilling-Tillage before specified,

Now First, That the Rate of Increase alone, is not the proper Standard to form a Judgment of the Profits of either Kind of Tillage, will be evident from a slight Attention to the foregoing Experiment. The Quantity of Seed requisite to sow an Acre of Land is in itself so small, *viz.* at the utmost but Eight or Ten Pecks, that it is of very little Consequence to a Farmer, whether he sows Ten Pecks (as in the common Broadcast) or only Two Pecks (as in the Treble Drill Method) on an Acre. But when he considers that from the First, his Acre will produce him 178 Pecks, and from the Second but 100 Pecks; there appears such a Difference in the Acreable Produce as must engage his Attention: So that taking nothing into the Account besides the Quantity of Seed sown, the Acreable Produce, and the Rate of Increase, he must necessarily prefer the Method which gives him the 178 Pecks on an Acre, to that which gives him only 100 Pecks, notwithstanding that the Latter is an Increase Fifty-fold, and the former only Seventeen-fold.

But secondly, That neither is the Acreable Produce the proper Foundation for our Calculations, is evident from this, that the Expence of Cultivating for the 178 Pecks *per Acre*, may happen to be proportionably greater than that of Cultivating for the 100 Pecks *per Acre*; so that the Profit upon each may be equal: In which Case the Farmer must prefer the 100 Pecks *per Acre* as affording him an *equal Profit* at a *less Expence*, though in Fact it be the lesser Acreable Produce. And if the Expence of the 178 Pecks *per Acre* were any Thing greater than proportionable, there would then be a double Reason for preferring the lesser Acreable Produce, *viz.* as giving a *greater Profit* at a *less Expence*.

Lastly, 'tis plain from what has been said that the proper Ground for calculating the comparative Profits of each Kind of Tillage will be found in considering the *Expences* and the *Returns* made in each, in any given time, and when Corn is at any given Price. For thus it will easily and plainly appear, in which of these two Kinds of Tillage a Farmer can turn his Stock of Money to best Account: Which is the only material Question. Nor can the Instability of the Price of Corn, any wise impeach the Certainty of this Method of Calculation, since to whatever Price it rises or falls, the Returns from each Kind of Tillage must rise or fall in like Manner; so that the Difference of Profit must always remain proportionally the same.

This then is the Method of Calculation observed in the following Estimate.

In CUMBERLAND.

Broadcast Tillage of One Acre.

	Seed sown.	Expencc.	Value of the Crop.		
			l.	s.	d.
1st Year —	Turnips	3 5 4	3	0	0
2d Year —	Fallow	1 8 6	4	16	0
3d Year —	Wheat				
Total — —		4 13 10	7	16	0
Deduct Expenses		—	4	13	6
			3	2	2
Deduct Three Years Rent —			1	4	3
Neat Profit from One Acre in Broad- cast for three Years —			1	18	2

Drilling Tillage of One Acre.

	Seed sown.	Expencc.	Value of the Crop.		
			l.	s.	d.
1st Year —	Turnips	2 1 8	2	10	0
2d Year —	Barley —	0 14 0	1	16	0
3d Year —	Wheat —	0 14 10	3	0	0
Total — —		3 9 6	7	6	0
Deduct Expenses		—	3	9	6
			3	16	6
Deduct Three Years Rent —			1	4	0
Neat Profit from One Acre in Drill- ing for Three Years. —			2	12	6

In YORKSHIRE.

Broad-cast Tillage of One Acre.

		Seed sown.	Expence.	Value of the Crop.		
			l. s. d.	l.	s.	d.
1st Year	—	Turnips	3 1 6	2	0	0
2d Year	—	Barley	0 18 0	3	12	0
3d Year	—	Clover	0 4 0	1	10	0
4th Year	—	Wheat	1 3 0	5	8	0
Total			5 6 6	12	10	0
Deduct Expence			—	5	6	6
				7	3	6
Deduct Four Years Rent			—	3	0	0
Neat Profit in Four Years			—	4	3	6

Drilling Tillage of One Acre.

		Expence.			Value of the Crop.		
		Barley.	Wheat.		Barley.	Wheat.	
		l. s. d.	l. s. d.		l. s. d.	l. s. d.	
1st Year		0 15 7½	0 17 10	—	3 8 7½	3 12 0	
2d Year		0 15 7½	0 17 10	—	3 8 7½	3 12 0	
3d Year		0 15 7½	0 17 10	—	3 8 7½	3 12 0	
4th Year		0 15 7½	0 17 10	—	3 8 7½	3 12 0	
Tot.		3 2 6	3 11 4	Tot.	13 14 6	14 8 0	
Deduct Expences					3 2 6	3 11 4	
					10 12 0	10 16 8	
Deduct four Years Rent					3 0 0	3 0 0	
Neat Profit in four Years					7 12 0	7 16 8	
					Barley.	Wheat.	

CALCULATION in CUMBERLAND.

The necessary Expences for three Years Tillage of one Acre in *Broadcast*, viz. 4l. 13s. 10d. producing neat Profit only — — 1 18 2

Will from the above Accounts be sufficient to till 1 Acr. 1 R. 16 P. for the same Number of Years in *Drilling*, and will produce neat Profit 3 10 9

Difference of Profit from 4l. 13s. 10d. in three Years in favour of Drilling — — 1 12 7

But since this Method of Drilling Tillage requires a Renewal of Manure only every five Years, whereas the Broadcast Method requires it every three Years; therefore, taking the Profits in each Kind of Tillage for fifteen Years together, will give the true Proportions.

Thus the said Sum of 4l. 13s. 10d. in Broadcast Tillage for fifteen Years, will produce a neat Profit of — — 9 10 10

But the same expended in Drilling and Horse-hoeing Tillage will in the same Number of Years produce a neat Profit of — — 22 1 2 $\frac{1}{4}$

And whatever Price Corn, &c. bears the Returns made by each Kind of Tillage will bear a Price proportional to these two Sums; or the Profits on the Drilling Tillage in this County for fifteen Years together will always be to that on the Broadcast Tillage for the same Time as 22l. 1s. 2 $\frac{1}{4}$ d. is to 9l. 10s. 10d. that is as 23 is to 10 nearly.

CALCULATION in YORKSHIRE.

The necessary Expences for four Years Tillage of one Acre in the improved Broad-cast Tillage, viz. 5l. 6s. 6d. producing neat Profit only

l. s. d.

4 3 6

Will be sufficient to till 1 Acre 2 R. 22 P. 6. for the same Number of Years in the Drilling Method, and will produce a neat Profit

In Barley 12 19 0
In Wheat 12 17 1 $\frac{1}{2}$

Which is more than three Times the Profit that is yielded by the Broadcast Method.

An Estimate of Expence upon a Plantation Acre of Wheat in the Drill Husbandry, the first Year.
 To Plowing 4 times, to prepare the Fallow 2 1 4
 To Harrowing twice for ditto — 0 9 0
 To Rent for the Year of Fallow — 0 18 0
 To Harrowing with the Drill Harrows 0 0 6½
 To sowing with the Drill Plow — 0 1 1
 To Seed Wheat generally 5 Stone, but suppose 6, 0 6 0

To the first, or Winter Hoeing — 0 1 7
 To the Spring Hoeing with the Cultivator 0 1 1
 To the 3d. Hoeing, *i. e.* to return the meliorated Earth to the Corn — 0 1 7
 To the fourth and final Hoeing — 0 1 1
 To Rent, the Year the Corn is growing 0 18 0

4 19 3½

Altho' the Drill Culture for the first Year is very near as expensive as the Common, yet after taking the Crop, the Expence and Labour of Fallow, and Loss of Time is not to be incurred again, as is unavoidable in the Common Husbandry.
 An Estimate of Expence upon an Acre of Drilled Wheat after the first Crop:
 One Plowing is all that is necessary.

To Plowing the Land once — 0 10 4
 To Harrowing with the Drill Harrow 0 0 6½
 To sowing with the Drill Plow 0 1 1
 To Seed-Wheat — 0 6 0

To four Times Horse-hoeing, as before stated — 0 17 11½
 To one Year's Rent — 0 5 4
 0 18 0
 2 1 3½

Be it remembered, 5 Stone is enough.
 Thus the Land is sown again with Wheat every Year, and instead of 4l. 9s which is the farmer's Expence in the Common Husbandry, exclusive of one Year's Rent of the Land: In the Drill Method it is no more than 17s. 11½d. and the Total Expence, instead of 5l. 7s. is no more than 2l. 1s. 3½d. Rent included; whereby there is a Saving of 3l. 5s. 8½d. an Acre.

Before the Account of Profit and Loss upon these different Methods of Culture be stated, it will be necessary to take Notice of an objection, which may perhaps be made to the above Charge of Plowing in the Common Husbandry.

It is pretended, that three Quarters of an Acre may be plowed in a day, with one Plow : But can it be done effectually ? The Land may, indeed, be *scratched*, but cannot really be plowed as it ought to be.

The Farmer ought to be cautioned against a Trick too frequently practised in Plowing.

When a Plow-man enters his Plow and passes across the Field, he turns a Sod about a Foot abroad ; when he is to return, he enters his Plow about four feet distant from the Outside of the former Furrow, and so turns another Sod of the same Breadth, which, when turned, just meets the former Sod ; thus four Feet of the Land appear to be plowed, whereas the Fact is, that the two Feet lying under the Sods is not touched with the Plow at all.

This Deception, added to the Practice of just *skimming* the Ground, enables Hirelings to undertake Plowing at Six and Seven Shillings an Acre.

But if a Plantation Acre of Land be well and effectually plowed, Ten Shillings and Fourpence as charged above, will not appear too much ; and it is, in Fact, supported by the common Course of Business.

When Wheat is to be sown, it is the general Custom to send a Barrel of Seed into the Field with two Plows, which is to sow an acre of Land, and that is the usual Days Work for two Plows in the general Course of Business.

Let

Let us see then, what the Expence will amount to: Eight Cattle will be Eight Shillings, Two Plow-men One Shilling and Four-pence; Two Drivers One Shilling, and the Seed man Eight-pence, which in all makes Eleven Shillings, and corresponds with the above Charge.

Dr. One Acre of Wheat and Oats in the Common Husbandry, for 15 Years.

	l.	s.	d.		Per Contra, Cr.	l.	s.	d.
To the Expence on a Wheat Crop, 2d. Year	5	7	0	By the Produce of Wheat, 9 Barrels, at 20s.	9	0	0	0
To the Expence on an Oat Crop, 3d. Year	2	5	2	By the Produce of Oats, 14 ——— at 6s.	4	4	0	0
To the Expence on a Wheat Crop, 5th Year	5	7	0	By the Produce of Wheat, 9 ——— at 20s.	9	0	0	0
To the Expence on an Oat Crop, 6th Year	2	5	2	By the Produce of Oats, 14 ——— at 6s.	4	4	0	0
To the Expence on a Wheat Crop, 8th Year	5	7	0	By the Produce of Wheat, 9 ——— at 20s.	9	0	0	0
To the Expence on an Oat Crop, 9th Year	2	5	2	By the Produce of Oats, 14 ——— at 6s.	4	4	0	0
To the Expence on a Wheat Crop, 11th Year	5	7	0	By the Produce of Wheat, 9 ——— at 20s.	9	0	0	0
To the Expence on an Oat Crop, 12th Year	2	5	2	By the Produce of Oats, 14 ——— at 6s.	4	4	0	0
To the Expence on a Wheat Crop, 14th Year	5	7	0	By the Produce of Wheat, 9 ——— at 20s.	9	0	0	0
To the Expence on an Oat Crop, 15th Year	2	5	2	By the Produce of Oats, 14 ——— at 6s.	4	4	0	0
	38	0	10		66	0	0	
	27	19	0					
	66	0	0					

To clear Profit in 15 Years

One Acre of Drilled Wheat, for 15 Years.

One Acre of Drilled Wheat, for 15 Years.									
Dr.		l.	s.	d.				Per Contra, Cr.	
To the 1st and 2d. Year's Expence	—	4	19	3½	By the Produce of Wheat,	2d. Year,	6 Barrels	l.	s. d.
To the 3d. Year's Expence	—	2	1	3½	By the Produce of Ditto.	3d. Year,	6	0	0
To the 4th Year's Expence	—	2	1	3½	By the Produce of Ditto,	4th Year,	6	0	0
To the 5th Year's Expence	—	2	1	3½	By the Produce of Ditto,	5th Year,	6	0	0
To the 6th Year's Expence	—	2	1	3½	By the Produce of Ditto,	6th Year,	6	0	0
To the 7th Year's Expence	—	2	1	3½	By the Produce of Ditto,	7th Year,	6	0	0
To the 8th Year's Expence	—	2	1	3½	By the Produce of Ditto,	8th Year,	6	0	0
To the 9th Year's Expence	—	2	1	3½	By the Produce of Ditto,	9th Year,	6	0	0
To the 10th Year's Expence	—	2	1	3½	By the Produce of Ditto,	10th Year,	6	0	0
To the 11th Year's Expence	—	2	1	3½	By the Produce of Ditto,	11th Year,	6	0	0
To the 12th Year's Expence	—	2	1	3½	By the Produce of Ditto,	12th Year,	6	0	0
To the 13th Year's Expence	—	2	1	3½	By the Produce of Ditto,	13th Year,	6	0	0
To the 14th Year's Expence	—	2	1	3½	By the Produce of Ditto,	14th Year,	6	0	0
To the 15th Year's Expence	—	2	1	3½	By the Produce of Ditto,	15th Year,	6	0	0
		31	16	1					
		52	3	11					
		84	0	0					
To clear Profit in 15 Years					84 0 0				

To clear Profit arising upon an Acre of Land in 15 Years, in the Drill Husbandry

To clear Profit arising upon an Acre of Land in 15 Years, in the Common Husbandry

Greater Profit on the Drilled Acre in 15 Years

Which amounts to 1l. 12s. 3¼d. per Annum, for 15 Years, on the Acre, more than by the Common Husbandry.

In the Drill Husbandry the Crops are stated at three Barrels of Wheat less upon an Acre than in the Common Husbandry, that it may not be supposed to be over-rated; but in the Common Husbandry, the Crops are rated at the highest; 14 Barrels of Oats an Acre, are also allowed in the Common Husbandry, which every Farmer must admit to be great Allowance upon the general produce.

That the Drill Culture will produce six Barrels an acre, is fully proved in Mr. *Baker's* Report at large, which will shortly be published, where it will be shewn, that much more has been produced.

Doubtless it will be observed, that in fifteen Years fourteen Wheat Crops are obtained in the Drill Husbandry; in the Common Husbandry only five Wheat and five Oat Crops; the five other years are not only lost, but are an heavy expence to the Farmer.

A Farmer having forty Acres of Tillage, supposing him to direct his Attention to bringing it to the Drill Culture, would make in fifteen Years 969l. 10s. more than he can in the Common Husbandry; which is such an Advantage, that the greater Profit in the Drilled Acre in fifteen Years will purchase the Fee Simple of that in the Common Husbandry, at twenty-seven Years purchase, valuing the Land eighteen Shillings an Acre.

Thus it appears, that in every fifteen Years the Fee Simple of all the Tillage Lands of the Kingdom, is lost to the Community by the common Course of Tillage.

In stating these Accounts, no mention is made of Fences, Water cutting the Land, Weeding and

and Reaping, as these Articles of Expence depend upon Variety of Circumstances, but in general, will be more upon the common Husbandry than the Drill.

Implements of Husbandry made in the New Factory at Laughlinstown, under the Patronage of the Right Honourable and Honourable Dublin Society.

THE Drill Plough, upon an improved Construction, for sowing all Kinds of Grain, Pulse, Turnip, and several Kinds of Grass Seed, 9l. 2s.—*N. B.* The Prices affixed are in the Irish Currency.

The Drill Harrows compleatly mounted, quite of a new, perfect, and substantial Construction, 5l. 13s. 9d.

The Hoe Plough, 2l.

The Single Cultivator, 1l. 14s. 1½d.

The Double Cultivator, 2l.

The above three are for Horse-hoing Drilled Crops.

The marking Plough with Carriage and Marker compleat, 3l. 8s. 3d.

The double mold board Hoe Plough, 5l. 13s. 9d.

N. B. The above are for the Drill Husbandry, but the two last are not absolutely necessary.

A Drill Plough of a new Construction, for sowing Drill Crops in the flat Way, at equal distant Rows.

The common Chip Plough, improved and compleatly ironed.

The Block Plough improved and compleatly ironed, 2l. 10s.

The

The Hunting-Plow improved, and compleatly ironed, 2l. 10s.

The Baiting Plough of a new Construction and compleatly ironed, 2l. 16s. 10½d.

The *Essex* Plough improved, to work with one Man and two Horses, 2l. 5s. 6d.

The *Lomax* Plough, improved and compleatly ironed, to work with four Cattle, 2l. 10s.

The same Plough for two Cattle, 2l.

The Garden Plough for one Horse, 2l.

The Turn Wrist or Kentish Plough, with or without Wheels.

Mr. *Tull*'s four Coultered Plough, 9l. 2s.

The Drain Plough, *i. e.* to cut out Drains. This is an entire new Instrument, 6l. 16s. 6d.

The Ditching Plough, *i. e.* to sink Ditches. This is a new Instrument, 1l. 14s. 1½d.

The *Hertfordshire* or double Wheel Plough.

The *Oxfordshire* or single Wheel Plough.

The Anchor Plough. This is an entire new Instrument, and will plough above two Acres a Day.

The Scarificator with five Coulters, for taking Moss off Meadow Land, and otherwise improving it, 4l. 11s.

Double Harrows for *four* Cattle. New Construction.

Ditto, for two Cattle. A New Construction.

A large Harrow upon Wheels. A new Instrument.

Triangular Plough Harrow, 5l. 13s. 9d. A new Instrument.

Triangular Plough Harrow, for one or two Horses, chiefly for Peas. A new Instrument.

Garden Hand Harrows.

Flax Harrows. A new Construction.

Swingle Trees improved and compleatly mounted. Sledges

Sledges and Truckles of any Construction, for Ploughs, Harrows, Bushes, Timber, Sacks of Corn, Lead, &c.

One Horse Carts of any Construction.

Three wheeled Carts, for one, two, or three Horses.

Larger Carts, for any Number of Horses.

Bomb Carts.

Small Carts of a new Construction, for Lawns or Grass Walks, which will not cut the Sod.

Water Carts of any Construction.

Low Back Carrs upon an improved Construction, calculated for the Ease of Cattle.

Coach, Post-chaise, and other Wheels.

Wheel-barrows of a neat and strong Kind.

Wheel-barrows of a new Kind.

Wheel-barrows for Gardens, which will not cut the Walks.

Water-barrows for Gardens.

Weed-barrows for Gardens.

Grass-barrows for Soiling Plough Cattle, when standing yoked in the Field.

Sheep-Racks of a new and compleat Construction. Field Gates of any Construction.

Rollers for Corn and Meadow, of a compleat and new Construction.

Spiked Rollers of any Construction.

A Roller of a new Construction, for reducing Fallows, be they ever so stubborn.

Fanners for Winnowing Corn in the Barn. Of different Constructions.

Brass Wire Sieves, for Corn and Seeds.

Hay Rakes of a neat and strong Kind.

Iron Rakes of various Kinds.

Hay Forks. Hay Pitching Forks.

Three pronged Forks for Dung.

Three pronged Forks for raising Stones and Rubbish out of Gardens.

Drag

Drag Forks for Dung.

Dock Irons for pulling up the Roots.

Brier Dog for pulling up Briers and Bushes by the Roots.

Stumping Irons for compleatly taking the Beards off Barley with Expedition.

Engines for cutting Hay and Straw for Horse Meat.

Ventilators for Hay Ricks. A new and useful Instrument, by which the Hay may be layed without being put in Tramp Cocks.

Bee Houses and Boxes, for taking the Honey without killing the Bees.

Gearing for Plough Cattle, upon a compleat and new Construction, by which the Cattle cannot be cut or hurt.

Manger Collars and Chains for Horses.

Cribs of a neat and new Construction, for foddering Black Cattle.

Spades of the neatest Kind, both for strong and reduced Ground.

The Drain Spade and Scoop, for sinking narrow subterraneous Drains.

Mattocks, Picks, and Crows.

Blasting Tools for Quarries.

The Turnip Slicing Engine. A new Instrument, *i. e.* for slicing Turnips for Black Cattle, by which two Men will slice a Ton in an Hour.

The Stubble-horse Raker, for speedily pulling up and gathering Stubble at one Operation.

An Instrument for thinning and horse-hoeing Turnips sown in the Broad-cast Way.