



1897

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THE  
FARMER'S TOUR  
THROUGH THE  
EAST of ENGLAND.

BEING

The Register of a Journey through various Counties  
of this Kingdom, to enquire into the State  
of AGRICULTURE, &c.

CONTAINING,

- |   |  |   |
|---|--|---|
| I. The particular Methods of cultivating the Soil.                |  | the Soil, and its Division into Farms, with various Circumstances attending their Size and State.               |
| II. The Conduct of live Stock, and the modern System of Breeding. |  |   |
| III. The State of Population, the Poor, Labour, Provisions, &c.   |  | V. The Minutes of above five hundred original Experiments, communicated by several of the Nobility, Gentry, &c. |
| IV. The Rental and Value of                                       |  |   |

WITH

Other Subjects that tend to explain the present State of  
ENGLISH HUSBANDRY.

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By the Author of the FARMER'S LETTERS, and the  
TOURS through the North and South of England.

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V O L. II.

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M D C C L X X I.

1771

QUOT & REMER & TOUR

OF THE HISTORY OF THE  
COUNTY OF  
DUNDEE IN SCOTLAND

BY

JOHN GIBSON, ESQ. OF ABERDEEN

IN TWO VOLUMES

THE FIRST

CONTAINS

THE HISTORY OF THE COUNTY OF DUNDEE

FROM THE EARLIEST PERIODS TO THE PRESENT

TO WHICH IS PREFIXED

A GENERAL HISTORY OF SCOTLAND

FROM THE EARLIEST PERIODS TO THE PRESENT

BY

JOHN GIBSON, ESQ. OF ABERDEEN

IN TWO VOLUMES

THE SECOND

CONTAINS

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THE  
FARMER'S TOUR  
THROUGH  
ENGLAND.

**A**T *Massingham*, north of *Rancton*, have been practised many of the most considerable improvements that have been known in *Norfolk*: This country, before the great works done by inclosing and marling, was all a wild sheep-walk; but through the uncommon spirit of many great farmers, has been advanced in value to an amazing degree.

The marle has been laid on in the proportion of 70 loads an acre, which has generally lasted 25 years; after that, many farmers have tried 30 loads more, but without success.

Mr. *Carr* of this place, who has had long experience in the marle husbandry, recommends laying on no more than 35 or 40 loads; and then as much more in three or

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four years, by which means it will far better incorporate with the soil. But the best way of using it after the first moderate marling, is to form composts of it with dung; so mixed, it works better in the soil. Mr. *Carr* thinks the best criterion of marle is to try it in water; if it is good, it will fall at once and dissolve, and make the water white; but as to the effervescence with acids, he has found the bad sorts have that quality more than the good, which is very uncommon.— He is further of opinion, that marle should be laid on in autumn, that the weather may shatter it.

Oil-cake, as a manure, is used by many farmers. Mr. *Carr*, in compliance with the general opinion, tried it in a large extent—he laid out 140 *l.* in oil-cake for one crop, but received very little benefit from it. On another occasion he fattened some bullocks on oil-cake, and the dung he raised from them, was twice as beneficial as the cakes themselves spread on the land: excellent manure!

Folding is here greatly depended on: they practise it throughout the year except just at lambing time. Mr. *Carr*, from an attentive  
observation,

observation, prefers the winter folding much to that of summer: this must be owing to the sun exhaling the virtue of dung in the latter season.

Six hundred sheep will fold 40 acres in the year.

The soil here is a light sandy loam; and lets in general at 8s. an acre. The course of crops is,

1. Turnips, fed on the land.
2. Barley or oats.
3. Clover one year, without ray-grass.
4. Wheat.

The barley yields on an average 4 or  $4\frac{1}{2}$  quarters *per* acre; and wheat from  $2\frac{1}{2}$  quarters to 5: the average about 3. Turnips are worth, one year with another, 27s. an acre: 400 fat sheep, Mr. Carr calculates, will eat a good acre every day; but this seems a very large allowance. They give an acre at a time, and always pull them up with cromes or hooks a day before the sheep are let in: they do not pen the sheep, but move on the hurdles, taking in an acre at a time, and using but one row. They are fed off sometimes with bullocks, but it is a bad way; for they find that one acre drawn and car-

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ried off, will go as far as three on the land. Their stock sheep they put to turnips three weeks before lambing time.

At the first improvement, it was common to take two crops of turnips running, for cleaning the land, and it answered very greatly: the barley sown after the two crops was much better than any ever known in the common course. Mr. *Carr* has had  $6\frac{1}{2}$  quarters *per acre* in that manner.

They mow the first crop of clover for hay, get  $1\frac{1}{2}$  load an acre, and feed the second; and they get better wheat after this management than after feeding through the whole year. If the clover is sown as above for mowing, they use but 10 *lb.* of seed an acre: but on that land designed for sheep, they sow a bushel of ray-grass with it. A sack of ray-grass should weigh 8 or 9 stone.

The profit of stock sheep is reckoned;

Lamb,	-	-	-	0	7	6
Wool,	-	-	-	0	1	0
				0 8 6		

And to shew from the instance of sheep, the amazing improvement of this country; it is a fact, that as many sheep are now kept as before

before the inclosure, while the whole country was sheep-walk. Mr. *Carr* keeps 500 flock sheep, besides 340 fat ones; and there were but 600 before, of so inferior a quality that his 500 are much superior in product. Upon Mrs. *Pigg's* farm only 1700 were kept while all was walk; and her present flock amounts to that number of much better sheep.—If these instances are not decisive in favour of inclosing open lands, and do not prove the absurdity of the assertions that arable improvements hurt our woollen manufactures, and therein prejudice the general interests of the state—Nothing can, nor is there a plain fact in the whole circle of domestic politics.

Land sells at 28 years purchase. Some tythes are gathered, but in general they are compounded for in the great. Poor rates, 1s. 3d. in the pound.

In their tillage they use but two horses in a plough, all wheel ones; and do two acres on an average in a day. The price 2s. 6d. an acre.

Mr. *Carr* has tried the cultivation of spring wheat; he finds it to turn out as well as any other crops he has had. The grain is equal

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to the best in the country, fine soft corn, not hard or steely : his crop was 3 quarters *per* acre. The particulars of Mr. Carr's farm are as follow :

1000 Acres in all	30 Horses
100 Wheat	2 Cows
200 Barley	20 Fatt'g beasts
40 Oats	500 Stock sheep
200 Turnips	300 Fatt'g ditto
250 Clover	in winter
60 Pease, &c.	40 Ditto in sum-
150 Various	mer.

Being in the neighbourhood of *Weasensham*, where Mr. *Billing* lives, the farmer who received several premiums from the *London* society for the culture of carrots, I determined to request a sight of the fields in which he raised them ; and also to enquire into the truth of the report I had heard, that he had for some years totally done with carrots. I viewed the land, and tried the depth of it with a strong stick ; it is a sandy loam, most excellent turnip-land ; it was cropped with that root, and a finer appearance never was seen ; I could not thrust the stick with all my force deeper than 6 inches, which surprized me. Mr. *Billing* informed me that

he

he ploughed no deeper for the carrots than for common crops, but yet he had many roots 16 inches long, and 15 or 16 inches in circumference. He left off the culture after the crop of which he published the account : this the world will doubtless think very extraordinary ; for nothing could be clearer or more decisive than the advantages there set forth : the profit evidently beat that of turnips by many degrees. I asked him the reason of his not continuing the culture : he said, They did not answer. I desired to know why. He replied, that the expences were so heavy that they could not do. Turnips are gained much easier, and at a much lighter expence.—This I found his general opinion. I enquired more minutely into a comparison of the two roots ; but Mr. *Billing* answered me only in generals.

This is a very critical circumstance in the history of carrots. The enemies of the culture cry out, *See how finely this new husbandry turns out, that has been so praised ! The only man that ever extended it over a large space of ground has given it up. Does not this sufficiently condemn it ?* This is the way in which many hereabouts, and doubtless else-

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where, will reason. To enter into a criticism on any man's conduct while it is merely private, would be impertinent; but the general interest of half the kingdom is concerned in the present case: I shall therefore offer a few remarks to shew, that Mr. *Billing's* conduct ought by no means to prevent the carrot culture from becoming common.

He condemned carrots in general, but it was only from general ideas: he praised turnips in a rational manner; I plough so often, at such an expence, hoe them for so much, and they pay me such a sum, at the same time that they clean the land; therefore I adhere to turnips. This was decisive; but now for carrots,—The medal was reversed; he knew nothing of the matter; he had no idea of the expence; consequently it was magnified: he talked of 20s. an acre; then of 30s. and at last of 50s. and 3*l.* When I asked him the value of an acre; *he could not tell.* What sheep will it maintain? *He could not say.* What beasts will it fat? *He did not know.* What profit will an acre pay in the gross? *He was not certain.* And, after another query or two—*He knew nothing at all of the matter.*

The



The reader will naturally ask, *how can this be with a man who wrote so clear an account of carrots?* In answer to which I would recommend to the society, to give their premiums to people who not only really perform the experiments required, but also give their own accounts of them; if a man cannot write, he should dictate—but the person who writes down his account ought not to supply any thing but the mere pen. There is a general turn in Mr. *Billing's* pamphlet in favour of carrots, that speaks as strongly as the experiments themselves; all which is directly contrary to his opinion. To some of my questions he told me there was a book published about carrots; in the same breath that he mentioned circumstances quite contrary to any in the pamphlet.

I take the real case to be this; he was advised to try carrots, but against his own opinion; and finding them better than he expected at first, repeated the trials for some time. When he came to enlarge the culture to whole fields, the attention they required in hoeing and the expence being much superior to turnips, gave him a disgust:—the largeness of his business made more  
 compendious

compendious crops agreeable—his men went regularly to work with turnips almost without directions; nor would he spare a sufficiency of hands from the other crops to do justice to the carrots: and these circumstances, I have little doubt, were the reason of his leaving off the practice. But as to drawing up an account of all the expences, with every disadvantage of the crop, and then striking a balance to discover its real merit—he never did it, and I will venture to pronounce he could not do it; for he took not minutes sufficient for the purpose—and those which he did take he has now forgotten. Let us for a moment examine his account of his crop, in 1763, of  $30\frac{1}{2}$  acres, and calculate, as well as his *data* will allow, the expences and profit.

## E X P E N C E S.

Ploughing $13\frac{1}{2}$ acres thrice, at 2s. 6d.	-	-	£.5	1	3
Ditto 17 acres twice	-	-	4	5	0
Dunging 3 acres, suppose we allow 12 load an acre, at 2s. 6d.			4	10	0
Seed, $30\frac{1}{2}$ acres, at 4lb. an acre			8	2	0
Sowing, suppose 6d. an acre			0	15	3
			<hr/>		
Carry over,			22	13	6

## THROUGH ENGLAND. 11

Brought over,		£.22	13	6
Harrowing, suppose	-	0	15	0
First hand-hoeing, at 11s.		16	16	6
Harrowing	-	0	7	6
Second hand-hoeing, at 4s. 6d.		6	17	3
Harrowing	-	0	7	6
Taking up, suppose 10s. an acre		15	5	0
Rent, at 14s.	-	21	7	0
Total expence,		84	9	3

Or 2l. 16s. 3d. per acre.

The produce in the account is calculated various ways; first it is by loads: the crop was 510 cart loads of carrots, equal to 300 loads of hay in the consumption.

300 Loads of hay, at 40s.		600	0	0
Expences	-	84	9	3
Clear profit	-	515	10	9

Or per acre 17l. 5s.

300 Loads of hay, at 35s.		525	0	0
Expences	-	84	9	3
Clear profit	-	440	10	9

Or per acre 14l. 13s. 7d.

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300 Loads of hay, at 30s.	£.450	0	0
Expences	84	9	3
	<hr/>		
Clear profit	365	10	9
	<hr/>		

Or per acre 12l. 3s.

I have given these various prices for the use of different places, where hay sells at different rates.

The calculation of the produce is by the stock maintained.

By fattening 12 neat beasts ; 49 shearing wethers ; 5 cows ; an heifer ; and 17 Scotch bullocks —yielded clear profit	-	£.108	0	0
Feeding a dairy of 35 cows, and a flock of 21 score sheep, three weeks, in the month of <i>April</i> *		20	0	0
		<hr/>		
Carry over,		128	0	0
		<hr/>		

\* This is the calculation in the pamphlet ; but the cows at 1s. 6d. and the sheep at 3d. a week, come to 23l. 12s. 6d. And turnips, it is said, were gone ; I leave the reader therefore to judge whether this is adequate.

Feeding

THROUGH ENGLAND. 13

Brought over,	-	£. 128	0	0
Feeding 16 cart-horses from <i>November</i> to the latter end of <i>May</i> ; 2 loads of carrots in this application saved 1 of hay *		35	0	0
Many swine fed; but no account taken	-	0	0	0
<hr/>				
Total produce,	-	163	0	0
Total expence,	-	84	9	3
Clear profit,	-	78	10	9

Or *per acre* 2 *l.* 5 *s.* 1 *d.*

Add to this, that the barley sown after carrots undunged in the middle of turnips dunged, was better than after the turnips—which is a prodigious superiority.

According to the lowest of these accounts, the carrots pay more in *CLEAR profit* by at least 15 *s.* an acre, than any turnips in this country pay in *TOTAL produce*. If this is not decisive in their favour, I know not what can be.

In the preceding account, 10 *s.* an acre is allowed for taking up, whereas many were ploughed up: which I will venture to assert is a slovenly and losing practice.

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\* No notice is taken of the saving of oats, which is the plain way of calculating.

All these carrots, except what were given to the horses, were fed on the ground like turnips: this is a deduction from their produce of at least two-thirds: it is every where known that one acre drawn and given in stalls, or a warm yard, will go as far as three in the field. The objections at page 15 of the pamphlet, are trivial, and suppose bad management in the method disapproved. Beasts in a warm yard well littered with stubble, and sheds around it, do not founder: nor need the stale be lost; and as to the beef not being so good, it is an absurdity.

After these accounts drawn from Mr. *Billing's* pamphlet, what are we to say to his leaving off the culture, under the idea of *its not answering*? Is it not very evident, that he has declined the most profitable crop that ever his farm produced? This is the effect of farmers not keeping accounts: they talk of experience; but written experience in these cases alone deserves the name. Mr. *Billing's* general notions (which are what farmers call experience) are diametrically contrary to the practice which he found excellent, and recommended as such to the public. He is  
not

not peculiar in this, for the profit of crops to which they are not heartily inclined, will never have their experience an advocate.

About *Sandringham*, the seat of *Henry Cornish, Henley, Esq.* are very considerable tracts of sandy land, which are applied at present only to the feeding rabbits: it is a very barren soil, but not I apprehend incapable of cultivation; it lets from 1 s. 6 d. to 2 s. 6 d. an acre in warrens: Mr. *Henley* has tried some experiments on it lately, with a view to discover how far it will answer cultivating. The value of it is prodigiously advanced by planting; that gentleman has formed several plantations, which thrive extremely: all the firs do well; and will pay a better rent for the land than any husbandry.

Much of the country improves in soil about *Snettisham*. The better sort of lands there are generally thrown into what is properly called the *Norfolk* husbandry.

Farms rise from 20 l. to 370 l. a year; but are in general from 70 l. to 90 l. The soil is either sand or sandy loam, on a chalky marle. The rent from 10 s. to 14 s. an acre: but the poor warren sands towards *Lynn* from 1 s. to 2 s. 6 d. an acre. The course most common is,

1. Turnips . . . . . times one year:
2. Barley . . . . . but by the best
3. Clover and ray- . . . . . farmers 2 years  
grafs; some- . . . . .
4. Wheat: . . . . .

For wheat they plough but once, sow 3 bushels, and gain on an average 3 quarters. Rye they substitute on some lands instead of wheat, sow 3 bushels, and get  $3\frac{1}{2}$  quarters. For barley they plough 3 times, sow  $2\frac{1}{2}$  or 3 bushels, and get 3 quarters. For oats they plough but once, sow 4 bushels an acre, and get on a medium 4 quarters. For pease they give but one earth; and reckon the average crop at 2 quarters.

Coleseed they cultivate both for feeding sheep and also for seed. They eat it off time enough to sow wheat; but the value of the food is not much. They feed those crops they intend for seed, but do mischief by it; the crops vary from  $3\frac{1}{2}$  to 10 quarters. They always sow wheat after it.

They plough four times for turnips, and hand-hoe twice. They draw some for fattening beasts, but in general eat it off with sheep. The average value 35s. an acre.

Clover they often mow twice for hay the first year; but always feed it the second.

A few



A few tares are sown to foil horses with in the stable, green; but it is not common.

Some buck-wheat is sown, which they feed on the land with various cattle, and sow wheat after it. A little hemp is beginning to be cultivated on spots of strong land; but not much.

They fold all their sheep, in winter as well as summer. Salt has been tried as a manure by a few farmers, who have bought whole ship-loads. It costs 3*l.* 5*s.* a ton; and 10*s.* more in expences, and a ton does for 3 acres. It was tried on a good loamy soil for wheat, this year, and the crop promises so greatly, that the farmer has bought a considerable quantity more.

Oil-cake is likewise much used; they break it to pieces not larger than walnuts by mills; one ton, at 3*l.* 10*s.* to 4*l.* 10*s.* does three acres. It is attended with very great benefit, but it lasts only one crop.

Lime they have tried, burnt from chalk: it does good; but is not comparable to marle. It does not last.

Marle is their grand manure; they lay 80 loads an acre; it is a fine fat sort, white, and lasts from 14 to 20 years. They do

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not chop their stubbles; but their hay they stack at home.

The best grass lets at 20s. an acre: They use it for fattening sheep; an acre will carry 5 or 6 fat wethers.

A cow will, in the best part of the season, give 7 or 8 lb. of butter a week: and the quantity of milk 3 or 4 gallons a day. The annual produce about 5l. 5s. a year. They understand very well the use of a dairy in keeping swine: they have much larger flocks on account of their cows.— A dairy-maid can take care of 20. They keep them in winter in the yard, and give them many turnips. There are large tracts of fresh water marshes: they buy beasts for them in the spring, and after the summer feeding give them turnips; they buy lean at from 7l. to 12l.; and sell at nearly double those prices. An ox-hide is worth from 15s. to 20s.: it is now of double the value it was 25 years ago.

Breeding flocks rise to 7 or 800. The profit is,

Lamb,	-	-	£	0	7	0
Wool,	-	-	0	1	0	
				<u>0</u>	<u>8</u>	<u>0</u>

The wether flocks they manage in the following manner; about *Lammas* they buy in wether lambs 6 or 7 months old; and keep them lean on stubbles, and offal turnips, giving them the leavings of the old flock of fat wethers; after which they are well kept through the summer on grasses, and folded all the time. Soon after *Michaelmas*, they are put to turnips; and are sold fat from *Candlemas* to *May-day*, and some even to *Midsummer*: they give them ray-grass and clover in the spring as soon as turnips are done. This conduct of sheep is reckoned much the most profitable method of managing them. They stock their grasses with 4 to an acre; and reckon that space of turnips will keep 10 from *Michaelmas* to *Candlemas*.

In their tillage, they reckon 16 horses necessary to 500 acres of arable land. They use 2 in a plough; do two acres a day; and in seed times 3, but it is with 4 horses; 2 in the morning, and 2 in the afternoon. One man looks after 4 or 5 horses, and every day ploughs 2 or 3 acres with 4 of them. They plough about 5 inches deep; and the price is 2*s.* 6*d.* an acre. The an-

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nual expence of a horse they calculate at 5*l.*; feed them much with straw cut into chaff. They begin to break their stubbles for a fallow soon after winter corn sowing. Wheel ploughs only are used; they find that they can do more a day with them than with swing ones, and at the same time much truer.

The hire of a cart, 4 horses, and a driver *per* day, 10*s.*

In the stocking farms, they reckon 3000*l.* necessary for one of 500*l.* a year; with which sum some marling may be done.

Tythes are generally compounded; they reckon 4*s.* in the pound a fair composition. Poor rates 1*s.* in the pound: 20 years ago they were but 6*d.*; and 30 years ago only 4*d.*

### LABOUR.

For the harvest of 15 weeks, 45*s.* to 50*s.* and board.

In hay-time, 1*s.* 6*d.* to 2*s.* and beer.

In winter, 1*s.* 2*d.*

Reaping, 5*s.*

Mowing barley, 1*s.*

————— grafs, 1*s.* to 2*s.*

Hceing

- Hoing turnips, 4*s.* and 2*s.*  
 Hedging and ditching, 1*s.* a rood of 7 yards.  
 Filling and spreading marle, 25*s.* the 120 loads, of about 30 bushels. In general 5 or 6 horses and 2 carts with one driver will carry 40 loads a day; the expence 12*s.* the 40 loads, besides the 8*s.* 4*d.* filling, &c.  
 Thrashing wheat, 1*s.* 2*d.* to 1*s.* 4*d.* per quarter.  
 ————— barley and oats, 8*d.* ditto.  
 ————— pease, 1*s.* 3*d.*  
 Head-man's wages, 10*l.* to 12*l.*  
 Next ditto, 9*l.*  
 Lad's, 4*l.* to 7*l.*  
 Dairy-maid's, 5*l.*  
 Other ditto, 3*l.* to 4*l.*  
 Women *per* day, in harvest, 1*s.* and board.  
 ————— in hay-time, 9*d.* and beer.  
 ————— in winter, 6*d.*  
 Value of a man's board, washing, and lodging, 10*l.* a year.

IMPLEMENTS.

- A waggon, 24*l.*  
 A cart, 10*l.*  
 A plough, 3*l.*  
 A pair of harrows, 1*l.*

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A roller, 1 *l.* 5 *s.*

Harnes per horse, 2 *l.* 2 *s.*

Laying a share and coulter, 1 *s.*

Shoeing, 1 *s.* 4 *d.*

### PROVISIONS.

Bread, - - 1  $\frac{1}{2}$  *d.* per *lb.*

Cheese, - - 4

Butter, - - 6

Beef, - - 3  $\frac{1}{2}$

Mutton, - - 3  $\frac{1}{2}$

Veal, - - 3

Pork, - - 3

Milk, - -  $\frac{1}{2}$  *d.* per pint.

Potatoes, - - 4 per peck.

Candles, - - 7

Soap, - - 6

Labourer's house-rent, 40 *s.*

\_\_\_\_\_ firing, 10 *s.*

### BUILDING.

Bricks, 20 *s.* a 1000.

Tiles, 3 *l.*

Oak timber per foot, 1 *s.* 6 *d.*

Ash ditto, 1 *s.* 2 *d.*

Elm ditto, 1 *s.* 2 *d.*

Soft ditto, 6 *d.* to 8 *d.*

A carpenter a day, 1 *s.* 9 *d.*

A mason and thatcher, ditto.

The particulars of a farm are as follow.

300 Acres in all	14 Horses
£. 150 Rent	10 Cows
60 Acres Wheat	10 Young cattle
60 Turnips	10 Fattening beasts
60 Barley	100 Sheep
60 Clover 1 year	3 Men
old	1 Boy
60 Ditto 2 years	4 Labourers.
old	

*Nicholas Styleman*, Esq; of this place has effected a very important improvement by banking out the sea: which undertaking was by many thought very daring and hazardous. In 1750, he began to form a bank a mile long, and it was completed in a year. By means of substituting single horse carts with 9 inch wheels, instead of barrows, he made an immense saving in the labour of the work. A square of 7 yards, by 12 inches deep, was dug and thrown into the carts for 1s. and only boys drove them. By this means he was enabled to be so uncommonly expeditious. The marshes were before let for only 4s. an acre; but they were directly advanced to 20s. In this manner 300 acres were at

once improved, at the small expence of 1500*l.* The advance of rent 240*l.* a year; which from the above capital is a profit of 16 *per cent.* An instance of successful spirit which does great honour to Mr. *Styleman.*

This gentleman has been very active in the inclosure of some commons in the parish of *Snettisham.* There were 41 houses that had a right of commonage over all the open fields after harvest, which totally prevented the use of turnips and clover. This great inconvenience induced Mr. *Styleman* to give his consent to and promote an act for inclosing the commons, and preventing so great an incumbrance on the husbandry of the open fields.

But in executing this idea he planned the outline of it in so candid and charitable a manner, that he kept as strict an eye to the interest of the poor people, as to his own. In lieu of rights of commonage, the proprietors of a parish inclosed, generally divide it amongst themselves, and give the poor no indemnity: But Mr. *Styleman* determined at first that they should have something valuable in exchange for their right.



right. He allotted each of the 41 old common right houses 3 acres contiguous to their dwellings, or their other property. 600 acres of old grass common were left so for these poor to turn their cattle on in a stinted manner. It maintains 205 cows, 120 mares and foals till 10 months old; 80 yearling calves, and 80 fillies. In their little inclosures they grow turnips, barley, wheat, and a little hemp.

The poor of the whole parish in general used to cut whins for firing over the whole extent of open fields: instead of this practice, which was the destruction of much land, he assigned them 100 acres of common in one inclosure for cutting turf: each house under 40s. a year rent has a right to cut 3000 flag (turf) a quantity sufficient for the winter's firing.

This system has been perfectly well adapted to the design proposed of attending minutely to the interest of the poor. Their little inclosures are of great use in maintaining their cows on a pinch in winter, on turnips or clover-hay; and their tillage is executed by their brood-mares. And it is observable, that no instance has been known  
of

of any inhabitant of these 41 cottages ever being chargeable to the parish. The poor rates are from 9*d.* to 1*s.* in the pound; before the inclosure they were 1*s.* 6*d.* This fall has been owing to the increase of employment arising from the inclosure and its consequences; and to the poor having been so much favoured in the act.

At the same time that such uncommon attention has been given to the poor; it has not destroyed, through a false idea, the rise of the landlord's income, generally expected on such occasions. The rents of the parish are in general raised a third by the inclosure: one farm belonging to the corporation of *Lynn*, is raised from 160*l.* to 360*l.* a year.

While these general good effects have taken place, an increase of inhabitants has been sensibly observed—for the great increase of employment, with the superior benefits attending a residence here to what are elsewhere found, has tempted various people to settle in the parish. The number of souls before the inclosure was 500; it is conjectured that they are now 600.

The comfort of living in this parish induces many to come and reside in it: if 20

new cottages were built, they would be immediately filled: and Mr. *Styleman* is not clear, that was such an addition made, whether the rates would rise.

He farther informed me, that there is never any want of hands in this country to execute any the greatest works; had he miles of banking to do, the procuring hands for the execution would never be the least difficult.

There is a tract of country (it is scarcely to be called *land*) in this place belonging to Mr. *Styleman*, which is not of any value at present, not producing 2 *d.* an acre: it is the shore from which the sea has withdrawn, and consists of nothing but shingle; that is, stones of various sizes, but none larger than a man's fist, of a great depth, and with a small mixture of sand among them. Here and there it yields a poor stunted appearance of something like grass—but bears a sprinkling of the eringo plant in tolerable luxuriance: it would be impossible regularly to cultivate such a soil; but I apprehend it would yield sustenance sufficient for several trees of the pine sort—such as firs, &c. &c. The experiment richly deserves the trial; for any

2

plantation

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plantation would turn out wonderfully profitable on such an absolute waste as this. Mr. *Styleman* has 1500 acres of it.

On other soils this gentleman has formed large plantations; he has above 100 acres of thriving ones. He finds from particular observation on their growth, that *Scotch* firs planted at 2 years old are worth 1s. 6d. on an average in 14 years.

Rent of an acre of land 14 years,

at 10s. - - - - - £. 7 0 0

Town charges, &c. - - - - - 1 0 0

Raising, fencing, planting, &c. 3 0 0

---

Expence *per* acre, - - - - - 11 0 0

---

Supposing the thinnings to pay the incidental expences; 5000 planted *per* acre at first, and thinned to 2000.

2000 trees, at 1s. 6d. cut down

at the end of 14 years - - - 150 0 0

Expences - - - - - 11 0 0

---

Clear profit, - - - - - 139 0 0

---

Upon 10 acres, this is £. 1390 0 0

Upon 50 ditto, - - - - - 6950 0 0

Upon 100 ditto, 13900 0 0

What amazing profit is this to reap in 14 years! I have supposed them all cut down at the end of the 14 years, to shew the certain profit of a species of farming never yet thought of, which is that of hiring land on a lease of 14 years, under the covenant of liberty not only to plant, but also to cut down again:—What husbandry will equal this? Suppose the number of trees but a fourth of the above, still no common crops under great expences will equal this with none at all.

In my way from *Snettisham* northwards, I passed by *Sommerfeld* and *Sunderland*, the two famous farms occupied by Mr. *Curtis*, and belonging to Mrs. *Henley* of *Docking*. I was mistaken upon another occasion in saying, that they consisted of 2500 acres: I was now informed that they amounted to no more than 1700. This farmer's sheep husbandry is nearly executed on the plan above-mentioned of buying and selling wethers; he generally fats 1000 every year on turnips; giving some the spring grass. So good a farmer's pursuing this conduct, gives one reason to think it the most profitable method.

The

The country is all under the best *Norfolk* culture from hence to *Wells*. About *Burnham*, land lets at 10*s.* 6*d.* an acre in large farms: the particulars of one are as follow.

1000 Acres in all	200 Turnips
£.500 Rent	300 Clover
400 Corn	700 Sheep.

From *Burnham* to *Wells* I observed the crops in general better than any I had seen since I entered *Norfolk*. Rents are 14*s.* an acre on an average. The produce of wheat from 4 to 5 quarters *per* acre. Of barley the same.

Turnips worth 50*s.* an acre.

Clover they leave two years on the land, but mix a peck of ray-grass with it. They value clay more than marle; lay 80 loads an acre, which lasts good 14 years; after which they add a little more.

Oil-cake they also use; they lay about half a ton *per* acre.

About *Warnham*, the seat of Sir *John Turner*, Bart. the husbandry is equal to any of the foregoing, with some variations that render it superior.

Farms rise from 200*l.* to 500*l.* a year.

The

The soils are gravelly loams, and what they call here white corky land; which is a chalk soil without the qualities of marle. Lets at 8s. or 9s. an acre.

Rents on an average the whole way from *Snettisham* about 10s.—From hence to *Holt* 14s. Their courses are,

- |            |                  |
|------------|------------------|
| 1. Fallow  | 5. Barley        |
| 2. Wheat   | 6. Clover, for 2 |
| 3. Barley  | years            |
| 4. Turnips | 7. Wheat.        |

*And,*

- |           |            |
|-----------|------------|
| 1. Fallow | 5. Turnips |
| 2. Wheat  | 6. Barley  |
| 3. Barley | 7. Clover  |
| 4. Pease  | 8. Wheat.  |

*Also,*

- |            |            |
|------------|------------|
| 1. Turnips | 3. Clover  |
| 2. Barley  | 4. Barley. |

*Likewise,*

- |            |            |
|------------|------------|
| 1. Turnips | 3. Clover. |
| 2. Barley  | 4. Wheat.  |

These are all good, except the crops of wheat and barley, coming together, which is quite contrary to the principles of the best *Norfolk* husbandry.

For wheat, if not on clover, they plough four times; sow 3 or 3½ bushels of seed, and gain

gain 3 quarters in return. They stir for barley three or four times, sow 3 bushels, and reckon the average produce  $4\frac{1}{2}$  quarters. They do not cultivate any oats; but buy those they want for their own use. For pease they plough thrice, sow 3 bushels, and get on a medium  $2\frac{1}{2}$  quarters.

Their tillage for turnips consists of four earths: they always hoe twice; and feed them off with beasts and sheep: they fat beasts of 50 stone upon turnips in this manner; they give them a little hay in the field, but never fatten, in the yard, or in stalls. They are very attentive to follow a fat stock with a lean one.—Lean beasts or sheep come after the stock of fat beasts.

They often find the barley better after beasts than after sheep alone: this I should suppose could be owing to nothing but the soil wanting heavier treading than sheep give it.—The average price of turnips 30s. an acre.

They mow the first growth of the first year's clover; but afterwards only feed it.

Some tares are sown, but they are chiefly used for soiling horses in the stable.



In their manuring they are attentive to keep their land in great heart. The sheep-fold is used all winter through, except just at lambing time ; it is applied either for wheat or turnips.

Marling has been practised here these many years ; they lay 60 loads an acre, at the expence of near 30s. It lasts 15 or 16 years in perfection ; they then lay 25 or 30 loads more, which last 10 or 12 years longer ; and after that they will again repeat it ; being convinced from experience, that the benefit of these repetitions is very great, contrary to the idea in some parts, where it is imagined that after the first marling it will not answer.

Another excellent practice, which perpetuates marling, is the forming composts of that and dung, which mixed manure they find answers better than either separately. If they would use 10 loads an acre of dung alone, they will not substitute more than 12 of this compost, and find it more beneficial. In one circumstance, however, they are strangely deficient ; they form the heap in layers ; but all the mixing it gets is in loading, for they never turn the heaps over.

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Oil-cake they use for wheat : a ton and three quarters will do for 3 acres ; the price from 3*l.* 3*s.* to 4*l.* a ton. They bring it both from *Ireland* and *Holland*, but they find the *Dutch* cakes best, from their not pressing them so much. It lasts strong only for one crop ; but is a help to the following turnips.

They buy large quantities of dung at *Wells*, for which they pay 1*s.* a cart-load. Much of the dung which now brings crops of 8 quarters an acre in the inclosures round the town, Sir *John Turner* remembers being thrown into the haven ; no man thought it worth the carriage.

Malt combs they sow on their barley lands ; the price 3*d.* a bushel.

One practice of which they are very tenacious, I cannot but condemn. They never chop their stubbles, accounting them as good ploughed into the ground as a light coat of dung. I should not declare against a maxim proved experimentally ; but that is not the case here, they never chop—but are conducted by a general idea.

Good turnips are sometimes gained after wheat, say they, without dung ; to what

can that be owing but to the stubble? I reply, the same thing is found in twenty places where the stubble is carried clean off. It may be owing to the oil-cake, or to twenty other reasons, not explained by them. But they find their soil so loose, that beasts feeding off turnips are preferable to sheep—how does this accord with leaving the land in so hollow and puffing a state as wheat stubble ploughed in, must do? The stubble is no *manure*: it is too dry and spread too thinly to enrich the soil: common sense must speak this. But now to the only material comparison: cut the stubble of half a field, cart it home, form it into a stack without the farm-yard, and where it shall not be enriched by any of that dung which is preserved there, but let the drain, which carries off the urine from all the buildings, and the wash from the yard, be filled with it from day to day, so as to absorb the whole; as fast as it is taken out, form it into a fresh heap mixed with some earth, or marle; after the winter, turn the heap over twice, and leave it till quite rotten: then cart it to a part of that half of the field from whence it was taken. Keep an exact account; charge

every expence of cutting, carting, re-carting, mixing, &c. &c. and then see which side of the field pays you best in clear profit. This case is not exactly necessary, for if the stubble heap is formed by rain alone into a mass of *rotten* substance, the superiority of the method will still be great. But I propose a way of saving that, which in all the farm-yards in *Norfolk*, and I may say the kingdom, runs to waste.

With good management the same system should be carried on within the yard—the litter should be increased by all the stubble; and the heap of dung receive all the urine either by a pump or water-bowl.

The breed of cattle here is all the little mongrel, *Norfolk* sort; but excellent for the dairy: a good cow will give 12 to 15 *lb.* of butter a week; they give 5 gallons of milk a day, some will give seven. Most of the dairies are let—the cow hirers give 3*l.* 3*s.* a year, and 3*l.* 10*s.* for which the farmer keeps up the stock, and finds all food and fuel. This is being paid little more than 1*s.* 3*d.* a week, besides the chance of losses;—it is astonishing how any person can think such a sum an adequate value for a cow.

## THROUGH ENGLAND. 37

Many swine are here kept on account of cows; a dairy of ten will maintain 20 hogs, but in summer all are kept on clover. A dairy-maid will take care of twelve. The winter food is turnips alone; no hay, except a little at calving.

Their system of fattening beasts is to buy in in *November*; they choose those that are forward in flesh; put them directly to turnips, and sell fat from clover and ray-grass in *June*. Buy at about 7*l.* and sell from 11*l.* to 12*l.*

The hide of a *Scotch* beast of 30 stone, is worth 15*s.*

Swine generally fat to 16 or 18 stone.

Flocks of sheep from 500 to 700; the profit the lamb and wool; which they reckon,

Lamb	-	-	-	0	9	0
Wool	-	-	-	0	1	3
Total profit,	-	-	-	0	10	3

The winter food is turnips alone; no hay, unless the snow is so deep that they cannot get at the crop.

In their tillage they reckon 12 horses necessary to 200 acres of arable land. They use 2 in a plough; do 2 acres or 2 ½ a day,

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at 2 journeys with 4 horses. Stir 4 inches deep: the price *per* acre 2*s.* 6*d.* The annual expence of a horse they calculate at 6*l.* 6*s.* The summer joist 2*s.* a week. They cut much straw into chaff.

They do not break up their stubbles for a fallow till *February* or *March*. Use only wheel ploughs; have tried swing ones, but find the former much lighter to the horses.

In the stocking farms, they reckon 2000*l.* necessary for one of 550 acres, the rent 300*l.* a year; and they divide that sum in the following manner:

30 Horses,	-	-	£. 360	0	0
20 Cows,	-	-	120	0	0
15 Beasts,	-	-	105	0	0
500 Sheep,	-	-	270	0	0
Swine,	-	-	10	0	0
3 Waggon,	-	-	60	0	0
4 Carts,	-	-	56	0	0
5 Ploughs,	-	-	16	0	0
5 Pair harrows,	-	-	7	0	0
2 Rollers,	-	-	2	0	0
Harnes,	-	-	60	0	0
Sundries,	-	-	40	0	0
Furniture,	-	-	100	0	0
Rent,	-	-	150	0	0
Carry over,	-	-	1356	0	0

## THROUGH ENGLAND. 39

Brought over,		£.1356	0	0
Town charges,	-	25	0	0
Tythe,	-	50	0	0
Housekeeping,	-	120	0	0
4 Men,	-	29	0	0
2 Boys,	-	7	0	0
3 Maids,	-	11	0	0
2 Labourers,	-	35	0	0
Extra labour,	-	50	0	0
Seed, 60 acres wheat,	-	45	0	0
—— 130 Barley,	-	52	0	0
—— 130 Clover,	-	30	0	0
—— 80 Turnips,	-	3	0	0
Cash in hand,	-	200	0	0
Total,		2013 0 0		

Land sells at 27 or 28 years purchase.

Tythe 2*s.* an acre in general.

Poor rates 8*d.* in the pound: 20 years ago they were but 4*d.* The employment spinning; all drink tea twice a day; and many a third time for dinner.

All the farmers have leases.

### LABOUR.

In harvest, 2*l.* 2*s.* or 2*l.* 5*s.* and board for the harvest.

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In hay-time, 1*s.* 6*d.* a day and beer.

In winter, 1*s.* and beer.

Mowing grafs, 1*s.* 6*d.* and beer.

Hoeing turnips, 4*s.* and 2*s.*

Filling marle cart, 25*s.* *per* 120, fill and spread.

Thrashing wheat, 1*s.* 6*d.* to 1*s.* 8*d.* *per* quarter.

———— barley and oats, 10*d.* *per* quarter.

———— peafe, 11*d.* ditto.

Head-man's wages, 10*l.*

Next ditto, 8*l.*

Next ditto, 5*l.* to 6*l.*

Lad's, 3*l.* 10*s.*

Maid's, 3*l.* to 3*l.* 10*s.*

Value of a man's board, washing and lodging, 10*l.*

The rise of labour, a fifth in three months of the year; and an eighth during the other nine.

### PROVISIONS.

Bread, - - 1  $\frac{1}{2}$  *d.* *per* *lb.*

Cheefe, - - 3

Butter, - - 6

Beef, - - 3  $\frac{1}{2}$

Mutton, - - 3  $\frac{1}{2}$

Veal, - - 3

Pork,



Pork,	-	-	3 $\frac{1}{2}$
Bacon,	-	-	7
Milk,	-	-	$\frac{1}{2}$ d. per pint.
Potatoes,	-	-	3 per peck.
Candles and soap,	7		per lb.
Labourer's house-rent,	33s.		
———— firing,	20s.		
———— wear of tools,	10s.		

BUILDING.

Bricks,	1 l. per 1000.
Oak timber	per foot, 1s. 6d.
Ash ditto,	1s. 2d.
Elm ditto,	1s.
Soft woods,	9d.
A carpenter and mason a day,	1s. 8d. and beer.
A thatcher,	1s. 8d. and beer, or 1s. a square yard.

The particulars of a farm.

500 Acres in all	130 Spring corn
£.260 Rent	130 Clover
30 Horses	60 Turnips
20 Cows	4 Men
12 Beasts	2 Boys
500 Sheep	2 Labourers.
60 Acres wheat	

Sir John Turner has for several years given

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given much attention to husbandry; he has in some instances improved on the management of his neighbours; good as that is—and in others, introduced practices unknown here before.

### *Experiment, No. 1.*

As the lord of the manor of *Wells*, he enjoyed a large tract of sea coast, and had a considerable space of low land cut by a creek and flooded every tide, which he thought would make good marsh-land if secured from the sea by a bank. He immediately executed it: and the success has answered his utmost wishes: the bank was made at the expence of 650*l.*; and 130 acres gained by it, which let at 25*s.* an acre.

As soon as the first work was done, he stopt all the springs, and little water-courses from the higher grounds, by large and deep drains on the edge of the marsh; and then cut a great carrier drain 10 feet wide, along the middle of it; into which smaller drains were cut; and all the water let into the sea by a sluice in the bank, the doors opening to let out the fresh water, and shutting by the superior weight of the tides.

A very

A very fortunate circumstance in this drainage is the surprizing plenty of fresh water: the sea was no sooner shut out, than the old creek was at once full of very fine fresh water, and has since been a winding fresh water of 4 acres: Such plenty of good water is of vast consequence in grazing lands.

As soon as the drains were made, the next business was to level the old creek, which ran very irregular, and in many places formed mishapen swamps and holes; all these were filled up: then the surface was pared and burnt an inch deep, and the land sowed with coleseed: the produce half a last an acre; sold at 18*l.* a last. After the coleseed a crop of oats was taken of 3 quarters an acre, and then another of 4 quarters. After which it was summer fallowed; then oats again; the crop 4  $\frac{1}{2}$  quarters an acre, and with them all sorts of grass seeds were sown, particularly white clover, red clover, trefoile, hay seeds, ray-grass, &c. In some places, all failed except the ray-grass: but white clover came amongst that the following year.

The grass has been extremely good ever since,

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since, as may easily be supposed from much of it being let at 25s. an acre; though the rent before the banking was only 6d. One acre fatts an ox of 50 stone, and a wether, sufficiently to put them to turnips; or would fatten 5 large *Lincolnshire* sheep. The grass is so sweet, that it will completely fatten beasts of 40 or 50 stone in 7 months. —Much of it has fattened 2 beasts of 40 stone, *per* acre.

After the drainage, Sir *John* assigned a piece of ten acres for the poor of the parish, which maintains a very great number of stock: nothing was done to this piece, and yet it is extreme good and rich grass; from which hint he determines, in case of a future undertaking of this sort, not to pare or plough it at all; only to level the small holes, and make the cuts for draining; which would render the improvement much less complex.

Sir *John Turner* has another tract of marshes of 1800 acres, let at present at only 4d. an acre; it is capable of being secured from the sea: The bank for that purpose should be 100 feet base, regularly sloped to 6 feet at the top; the  
height

height of it in the centre 10 feet. The expence of such a bank 3 miles long would be 5148*l.*; the interest of which sum, at 5 *per cent.* amounts to 257*l.*; and the product of the improvement the two first years, at

10 <i>s.</i> an acre,	-	-	-	£.900
The third year,	-	-	-	1350
The fourth,	-	-	-	1800
And afterwards,	-	-	-	2250

a year. The undertaking upon the whole, would be uncommonly profitable; far more advantageous than any other expenditure of such a sum in any part of the kingdom.

In forming a bank, the price of the work is 2*s.* 6*d.* to 4*s.* a floor of 400 cubical feet, for filling and barrowing the earth a single run; which is such a length, that men who run the barrows need not be relieved: planks to run on, to be found them; but they find their own barrows.

*Experiment, No. 2.*

Sainfoine, Sir *John Turner* has cultivated with great success. He has several pieces of it, which have answered better than the common husbandry on the same soil would have done. The soil is a light turnip loam

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on chalk. The first year the produce was very inconsiderable: The second, it was a pretty good crop: from that time to the present (18 years ago) it has produced at an average  $1\frac{1}{2}$  load an acre, worth 4*l.* on a moderate computation: and the after-grass 15*s.* an acre. For 7 years in the height of the crop, it yielded 2 loads an acre. Let us calculate the common husbandry according to the particulars given above.

*Expences.*

*First; Turnips.*

4 Earths and harrow-				
ings,	-	£.0	12	0
Manuring,	-	1	10	0
Seed and sowing,	-	0	0	9
Hoeing,	-	0	6	0
Rent, &c.	-	0	12	0
				<hr/>
				3 0 9

*Second; Barley.*

3 Earths and harrow-				
ing,	-	0	9	0
Seed and sowing,	-	0	8	0
Mowing and harvesting,	-	0	6	0
Thrashing,	-	0	3	9
Carrying out,	-	0	4	6
Rent,	-	0	12	0
				<hr/>
				2 3 3
				<hr/>
Carry over,	-		5	4 0

# THROUGH ENGLAND. 47.

Brought over,	-	£.5	4	0
<i>Third; Clover, &amp;c. two years.</i>				
Seed and sowing,		£.0	6	0
Mowing, carting, and stacking,	-		0	6
			0	12
			0	12

## *Fourth; Wheat.*

1 Earth,	-	0	3	0
Seed and sowing,		0	16	0
Manuring,	-	1	5	0
Reaping and harvesting,		0	7	6
Thrashing,	-	0	5	0
Carrying,	-	0	3	0
Rent,	-	0	12	0
			3	11
			6	6
Total,	-	9	7	6

## *Produce.*

Turnips,	-	1	10	0
Barley, 4 $\frac{1}{2}$ quarters,	-	4	1	0
Clover, first year,	-	3	0	0
----- second,	-	1	5	0
Wheat, 3 quarters,	-	6	0	0
Total produce,	-	15	16	0
Total expences,	-	9	7	6
Profit in 5 years,	-	6	8	6
Or <i>per acre per annum,</i>		1	5	8

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## SAINFOINE.

*Expences.*

Mowing, making, carting and stacking, - - -	£. 0 7 6
Rent, - - -	0 12 0
	<hr/>
	0 19 6
	<hr/>

*Produce.*

1 $\frac{1}{2}$ Load hay, - - -	4 0 0
After-grafs, - - -	0 15 0
	<hr/>
Total produce, -	4 15 0
Total expences, -	0 19 6
	<hr/>
Profit, - - -	3 15 6
Ditto by common husbandry,	1 5 8
	<hr/>
Superiority, - - -	2 9 10
	<hr/>

I have formed this calculation as an answer to those who insist that money is lost by this experiment. I have on both sides taken the particulars from the same authority—and from a person (Sir John's steward) who seemed to be of opinion, that the tillage course was most profitable. It is evident from hence, that sainfoine is the most advantageous. It would appear yet more



more so if the interest of the first stock was on both sides carried to account : Indeed the rents on poor soils, that are in many parts of the kingdom paid for this grass, are twice over what the *Norfolk* farmers pay for their best land ; which should give one some idea of its real value. The superiority of the sainfoine is so great, that it will admit the expenditure of 20*s.* *per* acre *per annum* in foot or ashes ;—without any corresponding increase of crop, and yet remain much more beneficial than the other.

*Experiment, No. 3.*

Lucerne he has cultivated with as much success as sainfoine. The soil on which it is sown is a good turnip land ; such as lets here at 7*s.* 6*d.* an acre. There is an acre and half of it ; half sown three years, and half four years ago : it was on a turnip fallow in the spring without corn : the weeds did not rise much, as the land was clean ; and those that came were cut down with the lucerne at the first mowing before they seeded. After which the growth of the crop was always quicker than that of

the grafs, confequently they were destroyed by the fcythe.

Every fpring it is harrowed until it carries the appearance of a fine fallow. It has been regularly cut every five weeks; and is found, from an accurate obfervation, to grow from 22 to 26 inches every 28 days. Every fpring it is manured after the harrowing, at the rate of 6 loads an acre of rotten dung.

As to the produce, it is very great: Six coach, and fix other horfes are chiefly fed with it through the fummer; but if horfes were to be confined folety to it, it would maintain at the rate of five *per* acre from the middle of *April* to *Michaelmas*, at 2 *s.* *per* horfe *per* week. Laft year's five cuttings, had they been made into hay, would have amounted to 6 tons *per* acre; which cannot be calculated at lefs than 12 *l.* 12 *s.*

One part of the crop, for a trial, was fet out with hand-hoes in the fame manner as turnips: I remarked that part of the piece to be about 2 inches higher growth than the reft, and was fomething of a deeper green.

Sir *John Turner* has, upon the whole, found

## THROUGH ENGLAND. 51

found it so extremely profitable, that he recommends it to every one; and has endeavoured, though in vain, to persuade his tenants to try it.

That the profit is very great; will appear from stating the expences and produce.

Rent, &c. &c.	-	-	-	£. 0	10	0
Harrowing,	-	-	-	0	2	6
Cutting five times,	-	-	-	0	7	0
Raking together, loading and carting home,	-	-	-	0	15	0
				<hr/>	1	14 6
				<hr/>		

### *Produce.*

Keeping 5 horses 26 weeks, at 2 s.	13	0	0
Expences,	1	14	6
			<hr/>
Clear profit,	11	5	6

The common husbandry of this country was found to pay *per*

acre profit,	-	-	1	5	8
			<hr/>		

Superiority of the lucerne,	9	19	10
			<hr/>

Sir *John's* common husbandry is very perfect; and remarkably adapted for keeping his land as clean as a garden. The soil of his farm is of two sorts, one a very

## 52 THE FARMER'S TOUR

light loam naturally poor, and is unprofitable if not very attentively managed. When he took it into his own hands he found it in miserable order; the course of crops he followed to bring it into good heart, is,

1. Turnips
2. Barley
3. Clover 12*lb.* and half a peck of ray-grass an acre, left on the land 2 years.

And then turnips again. So that only one crop of corn is taken in four years. The first growth of the clover is mown; and then fed for a year and half. Was a crop of wheat to be taken on the clover in the farmer's method, it would be a very poor one; and that of barley be as 6 to 10 at present.

Upon his better soil he takes,

- |            |           |
|------------|-----------|
| 1. Turnips | 3. Clover |
| 2. Barley  | 4. Wheat. |

And a proof of the goodness of the former, is the crops of turnips, barley and clover on the poor soil, being equal to those in this course on the rich one.

His turnips are worth 1*l.* 15*s.* on an average. The barley produces 5 quarters an acre; he has sometimes on weak land had

had 6 quarters. The clover gives a load and half of hay at one mowing: and the wheat 3 quarters *per* acre.

His farm is a very well distributed one. It in general is,

236 Acres in all	1 $\frac{1}{2}$ Lucerne
24 Acres Turnips	24 Meadow
24 Barley	16 Rich marsh
24 Clover for	15 Pasture
mowing	50 Plantation
24 Ditto fed	14 Water.
16 Sainfoine	

*Experiment, No. 4.*

Ofiers he tried for an experiment in his marsh land: three roods were planted, and let without difficulty for five guineas a year.—So vast a rent has determined him to apply more land to so profitable an use.

*Experiment, No. 5.*

In the preparation of a piece of very stiff, clung, marsh land for wheat, foreseeing that a great many ploughings would be necessary to reduce it, he determined to sow it with buck-wheat, with intention to plough it in in time for sowing the wheat.

## 54 THE FARMER'S TOUR

It was accordingly done; and it answered greatly in mellowing this harsh soil—much more than several extra ploughings would have done.

### *Experiment, No. 6.*

The neighbourhood of the sea in this country, suggested to this gentleman the thought of a manure which had totally escaped the farmers: it was that of sea ouze. Some of his tenants occupied a considerable tract of arable land that joins to the marshes by the shore; he directed one of them to ouze a small field at the rate of 50 loads an acre, in the same manner as if it was marle, and to sow it with turnips. No effect appeared in that crop; but in the barley which followed, the richness of the manure shewed itself strongly; it yielded four loads and an half an acre in the straw; the crop 6 or 7 quarters. The clover was uncommonly fine, and the wheat which followed the same—and the land ever since has displayed in the clearest manner, the vast fertility it has gained by this manure.

A proof no ways equivocal, is the practice of the tenant; for on seeing the first crop of barley he immediately went to work  
again,

again, and ouzed a larger field; and since that has been as regularly at it, as any one can be at marling: he has thus manured a large space of land, and continues the improvement. I rode over several of his fields thus managed, let at only 4s. an acre, and others at 6 or 8, which were covered with as fine crops of turnips, clover, and barley, as can be seen in *Norfolk*; he has no barley on ouzed land that will yield less than 5 or 6 quarters an acre; and he gets 3 quarters an acre of wheat on 4s. land.—There are marle pits in these fields, but the farmer prefers the ouze.

*Experiment, No. 7.*

Sir *John Turner* has not only planted many acres as an addition to the beauty of his situation, but has also attended to the growth of the trees, for discovering the profit of planting on his soils. In one plantation, *Scotch firs*, at 12 years growth, are worth 1 s. each,

*Experiment, No. 8.*

In a plantation of 50 years growth, the land 8 s. an acre, the trees are various, and the value as follows.

E 4

Oak,

## 56 THE FARMER'S TOUR

Oak, worth 10 s. each.

Ash, 12 s. 6 d. ditto.

Elm, 10 s. ditto.

Scotch fir, 7 s. 6 d. ditto.

Lime, 5 s. ditto.

Suppose the number of each equal, the average value is 9 s. The number about 5000 on an acre.

500 trees, at 9 s. are 225 l. or 4 l. 10 s. *per acre per annum*, from the first planting; but the thinnings have produced very considerable sums: and the grass under the trees would now let at 5 s. an acre.

### *Experiment, No. 9.*

In another plantation of 50 years growth, on land of 8 s. an acre, the trees, 250 *per acre*, are worth—

The oak, 16 s. each.

Ash, 10 s. ditto.

Lime, 9 s. ditto.

Scotch fir, 16 s. ditto.

Average, 12 s. 9 d.

250 at that price, come to 154 l. 7 s. 6 d. *per acre per annum*, besides the thinnings: this is above 3 l. *per acre per annum* from the first planting.

Had all been oak or fir, the total would have been 200 l. *per acre*; or 4 l. *per acre per annum* from the first planting.



*Experiment, No. 10.*

In another plantation, elms of 40 years growth (300 on an acre) are worth 22 s. each: this is 330 l. *per* acre; or more than 8 l. *per* acre *per annum*; and the land now would let as well as before the planting.

*Experiment, No. 11.*

A plantation of *Scotch* firs of 15 years growth, 300 on an acre, are worth 1 s. 6 d. each. This is 22 l. 10 s. an acre, or 1 l. 10 s. *per* acre *per annum*, besides thinnings.

The great profit of planting is obvious from these trials; but the whole state of the case by no means appears here; for the product of the thinnings is considerable. Sir *John* calculates, that he never receives less than a guinea an acre in thinnings throughout his plantations; which is easily to be conceived, as they are at first planted only 4 feet asunder.—The lowest profit here mentioned, is 1 l. 10 s. an acre; add 1 l. 1 s. for thinnings, it is 2 l. 11 s. *per* acre; deduct 11 s. rent and expences, there remains 40 s. an acre clear profit, which is more than the farmers make by all their trouble, industry and hazard.

I cannot but add to these trials in husbandry and planting, that Sir *John Turner* has proved himself to be not only a true friend to his country, in prosecuting these undertakings with spirit, but has also shewn himself a superior farmer in the midst of a country cultivated better than most in *England* \*.

From

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\* The situation of *Warham* is the most beautiful in *Norfolk*, and as much worth viewing as half the houses to which travellers are so eager to run. The house stands on the brow of a gently rising hill, backed to the north with very fine plantations of 50 years growth. They have somewhat the appearance of a crescent form, sheltering from the north, east, and west, and opening to the south, down over a beautiful winding vale, and then commanding a rich varied prospect of distant enclosures. Some villages and churches, scattered about the view, and a large, tho' regular water in the valley, all tend to make it chearful. While the thick woods which crown the tops of several hills, and the groves that sink into the vale, throw a picturesque beauty over the scene that cannot fail to strike the spectator.

The view that breaks at once upon you on coming through the dark fir wood in the approach from *London*, is very beautiful. You look at once upon a range of lofty plantations around the house, whose dark shade forms a

From *Warham* I took the coast road to *Sberringham*, making that the way to *Holt*. The crops, I observed, were not so good as about *Warham*, tho' much of the country is very well cultivated. I passed through  
*Stukey,*

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contrast to the brilliancy of the landskip that sets it off in the finest colours.—In front, you look upon various clumps, rising boldly from the water, united in some places with thick hedges, and in others broken by inclosures, that spreading over the hill to the left, the water is lost under a dark grove : the fields rise so thick above it, as to unite with a distant plantation which crowns the hill ; a church is happily situated on the point of it ; and beyond is seen a more distant rich wood-land. Full to the left, is a large *Danish* camp of three entrenchments, which are quite perfect \*. Turning to the right, you look upon an inclosure which breaks into the plantations ; it is fringed with open wood that half obscures the village, scattered thickly with trees ; and *Warham* steeples, one peeping over the thick plantation near the house, and the other more open, complete the view.

As you advance through the vale in the way to the house, the scenes change, but all are beautiful. The varied lawns, and hanging slopes, crowned in some places with woods, and in others broken by rich inclosures, are all truly picturesque and beautiful.

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\* An encampment of *Sweno* the *Dane*. One of the meadows is called *Sweno's* mead.

## 60 THE FARMER'S TOUR

*Stukey*\*, and near to *Blakeney*, about *Sheringham*, land lets at 15 s. an acre. Their course,

- |            |           |
|------------|-----------|
| 1. Turnips | 3. Clover |
| 2. Barley  | 4. Wheat. |

The turnips are generally as fine as any; the barley produces  $3\frac{1}{2}$  quarters *per* acre  
on

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\* The ride from *Warham* by *Stukey*, is thro' a much more picturesque country than is commonly met with in *Norfolk*; the road runs on the brow of the hill looking down on *Stukey* vale, and commanding, for some distance, a very complete landscape. The vale, which is composed of meadows of the finest verdure, winds in a very beautiful manner from out a thicket of woody inclosures, and retires, at the other, behind a projecting hill: an humble stream glides through it, and adds a cheerfulness, which water can alone confer. The hills rise in a bold manner: they are bare of wood; but that is compensated by the thick inclosures in which the village is scattered; forming with its church in a dip of the hill, and that of *Blakeney* above it, in a prouder situation, a most complete and pleasing picture.

Between *Stukey* and *Cley* is the little village of *Cockthorp*, which contains but three houses, and yet has furnished *Britain* with three famous admirals; Sir *Cloudsley Shovel*, Sir *John Narborough*, and Sir *Christopher Mims*.

Near *Blakeney* is another uncommon view, quite different

on an average; their clover is bad; not often more than a load of hay an acre: wheat 3, or  $3\frac{1}{2}$  quarters.

From *Sberringham* to *Holt*, is across a flat

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different from that at *Stukey*: the road winds into a sequestered valley shut out from the sea, by a bold, uncultivated hill. To the right, the grounds shelve from the road into a narrow vale. In this little woody hollow, is a village half seen among straggling trees: the steeple is uncommonly picturesque; half of it is hid by a rising slope, and the church three fourths obscured by a thicket of trees. The opposite hill rises very boldly; it presents a large inclosure, under the thick shade of a noble spreading wood; which hangs to the right into another valley, but is lost behind a regular bare hill of a conic form; which rises from the junction of the vales, in a very remarkable manner; and almost screens a distant range of rising inclosures. Immediately to the right, is a sloping tract of fields, and above them wild ground, with a white tower rising from behind it. The whole forms one of those half gloomy, and yet not unpleasing scenes, in which *Poussin* delighted; it is a spot worthy of such a pencil.

*Sberringham Cliff* is a very high steep shore; it looks on one side full upon the sea, and on the other over a various country abounding with inequalities of ground: many hills scattered wildly about, numerous cultivated inclosures, and six or seven villages are seen. *Sberringham* is prettily overlooked, backed by a rising hill.

flat disagreeable country: nine tenths of it a black ling heath, or a whin cover; but all greatly capable of cultivation.

About *Melton*\*, land lets at 14s. an acre on a medium; barley yields 4 quarters; wheat, 3  $\frac{1}{2}$ ; turnips very fine; but the clover, like that at *Sherringham*, is but middling. Large dairies are kept about here; they feed the cows in the pastures and meadows, but are wretched managers (like the generality of the *Norfolk* farmers) of their grass lands; they are all over-run with rushes and other rubbish; very wet, but no drains made.

From *Holt* towards † *Aylsham*, the country is in general rich and well cultivated; but

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\* Sir EDWARD ASHLEY, at this place, has a large park which has lately been ornamented judiciously; and a water made with uncommon difficulty; which, when properly united with wood, will have a good effect. From a windmill near the park is a prodigious view of a rich woodland country, finely intermixed with corn-fields, and wanting nothing but a river to be complete.

† At WOLTERTON Lord *Walpole* has a seat well envirohed with wood. The *Hall*, 30 by 27. —A *Dining-room*, 30 by 27. A good picture of

but improves as you advance. In the neighbourhood of the latter place for some miles around, particularly towards the coast, the husbandry is very good.

Farms are rather small; in general from 50*l.* a year to 100 and 150*l.* The soil a mixed one; gravelly, and sandy loams; excellent for turnips; lets from 7*s.* 6*d.* to 20*s.*; average about 14*s.* The whole way  
to

of King *Charles*.—A *Dressing-room*, 21 by 18, hung with tapestry of lively and spirited colours.—A *Bed-chamber*, 25 by 22, the tapestry here also is very fine; the chimney-piece handsome. The *Saloon*, 36 by 30; the tapestry, sofas, and chairs, represent *Æsop's* fables, done in a natural, and pleasing manner. The windows look on some very fine woods.—A *Drawing-room*, 25 by 21, the tapestry fine.—A *Bed-chamber*, 22 by 21.—A *Dressing-room*, 21 by 18. The pier glasses throughout the house are large and very handsome.

Adjoining to *Wolterton* park is *Blickling*, the seat of the Earl of *Buckinghamshire*; the park is large, and the water (in the form of a great winding river) one of the finest in the kingdom: It is near a mile long, and in general from 2 to 4 or 500 yards over; the colour is very bright. But what renders it uncommonly beautiful, is the noble accompaniment of wood. The hills rise from the edge in a various manner: in some  
places

## 64 THE FARMER'S TOUR

to *Norwich*, it runs at about 12 s. Their courses of husbandry have variations.

- |            |            |
|------------|------------|
| 1. Turnips | 4. Wheat   |
| 2. Barley  | 5. Barley. |
| 3. Clover  |            |

This last crop of barley is bad.—Another course they have, is to leave it out, and take turnips again.

### 1. Turnips

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places they are steep and bold; in others they hang in waving lawns; and so crowned and spread with wood, that the whole scene is environed with a dark shade, finely contrasting the brightness of the water.—Some woods of majestic oaks and beech, dip in the very water; while others gently retire from it, and only shade the distant hills. Sometimes they open in large breaks, and let in the view of others darker than themselves, or rise so boldly from the water's edge, as to exclude every other view.—About the center of the water, on the right of it, is a projecting hill, thickly covered with beech: their stems are free from leaves, but their heads unite and form so deep a gloom, that not a ray of the sun can find admittance, while it illumines the water, on which you look both ways. This partial view of the lake (for the branches of the beech hang over the water, and form an horizon for the scene) is strikingly beautiful. You will dwell on it with uncommon pleasure.

The house is unfortunately situated close upon  
one



- |            |           |
|------------|-----------|
| 1. Turnips | 4. Wheat  |
| 2. Barley  | 5. Pease. |
| 3. Clover  |           |

*Also,*

- |                   |           |
|-------------------|-----------|
| 1. Turnips        | 4. Barley |
| 2. Barley         | 5. Pease. |
| 3. Clover 2 years |           |

This

one end of the water; but it is a large and good one. The following are the principal rooms.

The *New-room*, 27 by 26.

The *Study*, 33 by 21. Here is a very fine portrait of Sir *John Maynard*: and another of Sir *H. Hobart*, by *Lely*.

*Dressing-room*, 21 square.

*Bed-chamber*, 27 by 21.

*Dressing-room*, 25 by 21.

*Breakfast ditto*, 28 by 22. Here is a good copy of a portrait of Sir *James Hobart*.

On the principal floor, first,

An *Anti-room*, 25 by 24.

*Drawing-room*, 45 by 24. Here are the King and Queen, by *Ramsay*, both well done. Portrait of Sir *John Maynard*; a good one. And another of Lord Chief Justice *Hobard*, in which both the face and hands are fine.

*Dressing-room*, 25 by 22.

*Bed-chamber*, 25 by 16. Ditto, 27 by 22.

*Library*, 120 by 22, and 22 high. The book-case arranged on both sides. It is an excellent collection; and an admirable rendezvous room.

## 66 THE FARMER'S TOUR

This is a good course for many soils. Another they find extremely beneficial, is,

1. Turnips
2. Barley
3. Clover 2 years
4. Buckwheat
5. Wheat.

They plough once for wheat, sow  $2 \frac{1}{2}$  bushels if they get it into the land early, but 3 bushels if later; 3 quarters or  $3 \frac{1}{2}$  are the average produce; but 5 quarters are often gained. For barley they plough three or four times; sow 4 bushels, and get 4 quarters in return; seldom more than 5. They give the same tillage for oats as for barley, which is an uncommon instance of good husbandry; sow  $4 \frac{1}{2}$  or 5 bushels, and get  $5 \frac{1}{2}$  or 6 quarters on an average. For pease they stir but once, sow 4 bushels; never hoe, but get  $3 \frac{1}{2}$  quarters an acre.

They give four or five earths for turnips, hand-hoe twice; and feed off with cattle and sheep: if the crop is large, they have a method of expending them, which I believe is peculiar to themselves. They first feed one piece, suppose an acre, by running a row of hurdles across the field: then, before they move the hurdles, they draw another acre, and cart them on to the  
acre

acre eaten off for the cattle; and so on throughout the field: always carting the crop from the land where it grows to the part cleared. Their motive for putting themselves to this expence, is to make the turnips go so much the further, and at the same time preserve the benefit of the cattle to the barley crop: if the produce is large, and cattle are turned in, they spoil as much as they eat; but when the turnips are laid clear above the soil, and the earth partly shaken off, they eat them up clean.—The price *per* acre, to draw and cart them in this manner, is from 50*s.* to 3*l.*

Of clover they mow the first crop, and feed the second: the crop of hay generally 2 loads an acre; sometimes 3. They sow 10*lb.* of clover, and a peck of ray-grass, which they here call by its proper name Darnel; but if for their lambs in spring, they sow a peck of the latter.

1. No tares cultivated.

2. For buck-wheat they plough three or four times, sow 5 pecks to an acre; the average crop 4 quarters, sometimes 6. It is as good as oats for horses; sells generally 2*s.* a quarter under the price of barley

—but its being an ameliorating crop like pease, the inferiority of price is abundantly made up. They always sow wheat after it; and on cold springy land sometimes plough it in for that crop, by using a bush faggot before the ploughs to level it: and this management answers prodigiously for two crops; better than dung. They never sow buck-wheat till the beginning of *June*: and they reckon that is more beneficial to the land than any other crop. Wheat very seldom fails of great crops after it.

In their manuring they are pretty attentive. They fold all the year through, for wheat or turnips. Marle they depend much on; the sort they use most is a grey marle, it is soft and soapy: they do not lay above 12 large loads an acre, as much as five horses can draw, and this quantity will last 20 years; after which they repeat it. But then I should add, as an explanation of the smallness of this quantity, that they regularly cart out their farm-yard dung on to layers of marle, mix them up together, and then spread them on their land; this is a regular addition to it, and they have long experienced the practice to be excellent.

lent. They harrow their stubbles by way of chopping them, and cart them home to the yard.

They apply their meadow and pasture lands to keeping young stock and cows; the former they bring into them for water, but keep them on the uplands of nights: 2 acres will carry a cow through the summer: A good one will give 6 gallons of milk a day: as to the product, they are generally let at 3*l.* 10*s.* to 4*l.* a head.— To 20 cows they keep from 25 to 30 shots; that is,  $\frac{1}{2}$  and  $\frac{3}{4}$  grown hogs. A dairymaid will take care of 20 cows. The winter food is straw or turnips; no hay: and a calf is worth 30*s.* in 7 or 8 weeks. They keep them in winter in the yard.

They fatten their swine to 28 stone, but the average is not above 16. They have no regular flocks of sheep; but they fold those they keep. In *August* they buy old crones, and also lambs of that year; likewise shearling wethers; all which sorts they turn into their stubbles at *Christmas*, when they put them to turnips, and after that to elover and ray-grass. If they buy in at

## 70 THE FARMER'S TOUR

10 s. they will sell them fat in *April* or *May* at 18 s.; which, for the time, is great profit.

Sometimes they buy lean wethers, and get them fleshy enough by *Christmas*, to put to turnips, and will sell them fat from that food—shearling ewe lambs will clip 3 or 3  $\frac{1}{2}$  lb. of wool.

In respect to the rot, they apprehend that it is owing in a great measure to springy land in low meadows: those fields in which heavy fogs are apt to hang are bad, but no land, whatever may be its quality, will rot if the sheep are never turned on it until the sun has exhales all the dew. Floods they reckon not at all prejudicial.—These ideas appear to me not to be so clear as I could wish.

In their tillage, they reckon 5 horses necessary for 100 acres of ploughed ground; use 2 in a plough, and do 2 acres a day. The ploughman goes out at 6 in the morning, and does an acre by 11 o'clock; he then comes home and baits till 2; and goes out again till 7 at night; in which time he does an acre more: all this is done with a pair of horses, besides taking care of 5 in all: this is great work, and much exceeding

ing

ing what is done in most other countries. But they assert, that it can only be done with wheel ploughs; they have tried swing ones, but they do not equal the wheeled. They stir from 3 to 5 inches deep; the price 2s. 6d. an acre.—The annual expence of a horse they reckon at 5l. 10s. They feed much with straw cut into chaff.—They do not break up their stubbles for a fallow till after *Christmas*.

In the hiring and stocking farms, they reckon 700l. necessary for 300 acres.

Tythes are compounded; they pay 3s. in the pound.

Poor rates 2s. in the pound; they have risen a fourth in 20 years.—The employment of the women and children spinning: all drink tea.

Many leases are granted, but not so many as formerly.

The farmers carry their corn from 6 to 10 miles.

### LABOUR.

In harvest, 36s. and board for the harvest.

In hay-time, 1s. 2d. and beer.

In winter, 1s. and beer.

## 72 THE FARMER'S TOUR

- Reaping, 5 s.  
 Mowing spring corn, 1 s. to 1 s. 2 d.  
 ———— grafs, 1 s.  
 Hoing turnips, 4 s. and 2 s.  
 Filling marle cart, 2  $\frac{1}{2}$  d. a load; and 1 s. an  
 acre fpreading.  
 Thrashing wheat, 2 s. a quarter.  
 ———— barley and oats, 1 s.  
 ———— peafe, 1 s. 4 d.  
 First man's wages, 7 l. 7 s. and 8 l.  
 Second ditto, 6 l. and 5 l. 5 s.  
 Lad's, 3 l.  
 Dairy-maid, 3 l. 10 s.  
 Other ditto, 2 l. 10 s. to 2 l. 15 s.  
 Women *per* day, in harvest, 6 d. and board.  
 ———— in hay-time, ditto.  
 ———— in winter, 6 d.  
 The rife of labour a fourth in 20 years.

### PROVISIONS.

Bread,	-	-	1 $\frac{1}{2}$ d. <i>per</i> pound.
Cheefe,			4
Butter,	-	-	6 $\frac{1}{2}$
Beef,	-	-	3 $\frac{1}{2}$
Mutton,			3 $\frac{1}{2}$
Veal,	-	-	3
Pork,	-	-	3 $\frac{1}{2}$
Bacon,	-	-	6 $\frac{1}{2}$

Labourer's



Labourer's house-rent, 40 s.

—— firing, from the commons.

The particulars of a farm as follow.

300 Acres in all	12 Horses
250 Arable	20 Cows
50 Grass	20 Fattening beasts
£.200 Rent	30 Young cattle
42 Acres of Tur-	100 Sheep
nips	2 Men
60 Barley	1 Boy
24 Wheat	2 Maids
84 Clover	4 Labourers.
42 Pease	

## LETTER XII.

THE city of *Norwich* is one of the most considerable in *England* after *London*; it stands on more ground than any other: But in number of inhabitants, some others assert an equality. By an accurate account taken a few years ago, the number reckoned by the houses amounted to 40000; but by the bills of mortality only to 36000; the average therefore of these (38000) may be taken as more probable than either.

The staple manufactures are crapes and camblets; besides which they make in great abundance damasks, sattins, alopeens, &c. &c. &c. They work up the *Leicestershire* and *Lincolnshire* wool chiefly, which is brought here for combing and spinning, while the *Norfolk* wool goes to *Yorkshire* for carding and cloths. And what is a remarkable circumstance, not discovered many years, is, that the *Norfolk* sheep yield a wool about their necks equal to the  
best

best from *Spain*; and is in price to the rest as 20 to 7.

The earnings of the manufacturers are various, but in general high.

Men on an average do not exceed 5 s. a week; but then many women earn as much: and boys of 15 or 16 likewise the same.

Draw-boys, from 10 to 13, 2 s. 6 d. a week,

Pipe-boys and girls, from 5 to 9 years old, 9 d.

Combers, on an average, 7 s.

Dyers, 15 s.

Hot-pressers, 13 s.

Women by doubling yarn, 2 s.

Ditto filk, 8 s.

Ditto by spinning, 2 s. 6 d. to 3 s.

The weaving man and his boy, who now earn in general 7 s. a week, could earn with ease 11 s. if industrious.—But it is remarkable, that those men and their families who earn but 6 s. a week, are much happier and better off than those who earn 2 s. or 3 s. extraordinary; for such extra earnings are mostly spent at the alehouse, or in idleness, which prejudice their following work. This is precisely the same effect

effect as they have found when the prices of provisions have been very cheap; it results from the same cause. And this city has been very often pestered with mobs and insurrections under the pretence of an high price of provisions, merely because such dearness would not allow the men that portion of idleness and other indulgence which low rates throw them into.

In the management of the poor, there was once a circumstance that deserves noting. Previous to the year 1727, the rates throughout the city were immoderately burthened with weekly allowances to the poor, of 1 s. 6 d. 2 s. 2 s. 6 d. or 3 s. a family, in which manner 1200 l. a year was given. A resolution was taken in that year to strike them all off: it was accordingly done; and nothing ensued but murmuring; no ill consequence at all.—

7 or 800 souls are kept in the work-house of this city for 7 or 8000 l. a year in all expences.

In respect to the present state of the manufacture, it is neither brisk, nor very dull. They could execute more orders than they have; and some among them complain because

cause they have not so great a trade as during the war; for then they could not answer the demand, it was so uncommonly great (from 1743 to 1763 was their famous æra). This was however owing in some measure to many manufacturers exporting so largely on speculation, that the markets have been overstocked ever since;—and have occasioned that falling off which has been perceived since.—Indeed the unfortunate difference subsisting between *Great Britain* and the colonies is a great injury to them.

They now do not send any thing to *North America*; but much to the *West-Indies*. Their foreign export is, to

<i>Rotterdam</i>	<i>Cadiz</i>
<i>Ostend</i>	<i>Lisbon</i>
<i>Middleburgh</i>	<i>Barcelona</i>
<i>All Flanders</i>	<i>Hambro'</i>
<i>Leghorn</i>	All the <i>Baltic</i> ex-
<i>Triest</i>	cept <i>Sweden</i> ,
<i>Naples</i>	wherethey are
<i>Genoa</i>	prohibited.

In 70 years last past, the manufacture is increased as from 4 to 12.

During the last war, *Norwich* supplied

the

the army and navy with 4000 recruits; but her manufactures did not suffer in the least: for they carried on more trade than ever.—The truly industrious do not enlist; and as to the idle, the greatest favour to be done to any place is to sweep them all away.

They are in this city curious in building with flint; they cut it in regular squares, and form as neat joints as with the best bricks. The Bridewell is thus built, and so well executed, that it is worth a traveller's notice.

The general amount of the *Norwich* manufacture may be calculated thus.

A regular export to <i>Rotterdam</i>	
by shipping, every 6 weeks,	
of goods to the amount of	
<i>per annum</i> , - - -	£.480,000
26 tons of goods sent by broad-	
wheeled waggons weekly to	
<i>London</i> , at 50 <i>l.</i> a ton on an	
average, 13000 tons <i>per an-</i>	
<i>num</i> : Value, - - -	676,000
By occasional ships and waggons	
to various places; calcu-	
lated at, - - -	200,000
	<hr/>
	£.1,356,000

Upon a reconsideration of this table, it was thought that the 676,000 *l.* by waggons, was rather too high: suppose therefore only 10,000 tons, it is then 520,000 *l.*; and the total 1,200,000 *l.*

Another method taken to calculate the amount was, by adding up the total sum supposed to be returned annually by every house in *Norwich*; and this method made it 1,150,000 *l.* This sum coming so near the other, is a strong confirmation of it.

A third method taken, was by various ways to calculate the number of looms: these were made 12,000; and it is a common idea in *Norwich* to suppose each with all its attendants works 100 *l. per ann.*:—this also makes the total 1,200,000 *l.*; which sum, upon the whole, appears to be very near the real truth.

Respecting the proportion between the original material, and the labour employed upon it, they have a very sure and easy method of discovering it. The average value of a piece of stuff is 50 *s.*: it weighs 6 *lb.* at 10 *d.* a *lb.* which is 5 *s.*: so the material is a tenth of the total manufacture.

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Total,	-	-	-	£. 1,200,000
A tenth,	-	-	-	120,000
				<hr/>
Amount of labour	-	-	-	1,080,000
				<hr/>

In which is included the profit of the master manufacturer.—There is no occasion to separate that from the gross sum; as it is in fact *labour* as much as the manual part. All the people maintained and employed by a manufacture are the same in a publick view, whether they earn 10,000 *l.* a year, or but 10 *l.*

The material point remaining is to discover how many people are employed to earn the publick one million *per annum*; and for this calculation I have one *datum* which is to the purpose. They generally imagine in *Norwich*, that each loom employs 6 persons in the whole; and as the number is 12,000, there are consequently 72,000 people employed by this manufacture. And this is a fresh confirmation of the preceding accounts; for I was in general told that more hands worked out of *Norwich*, for many miles around, than in it. 1,200,000 *l.* divided by 72,000, gives 16 *l.* each for the earnings of every person.

This,



This, I must confess, appears to me a very large sum; for I have no conception of all the persons employed earning 16*l.* a year, which is 1*s.* a day; if therefore any mistake is in the preceding account, it must be in the number of looms.—The total amount of the manufacture is taken from clear facts (not suppositions) there must consequently be looms sufficient to work to that amount, 16*l.* a year may not be *much* above the truth, though probably *something*; for we should consider that women and boys of 15 or 16, earn as much as most of the men: whereas in various other manufactures with which I am acquainted, they do not nearly equal them: and we should further consider, that we include in this 16*l.* a year, the whole profit of the master manufacturer.—The deviation therefore from fact, cannot be very considerable. For if the master manufacturer's profit is calculated at 14 *per cent.* and deducted accordingly, this 16*l.* a year is thereby reduced to about 11*l.* 11*s.* a year.—

It may therefore be taken as no contemptible fact, that 70 or 80 thousand people employed in a manufacture, whatever it

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may be, will earn 1,000,000*l.* a year. I say *whatever it may be*; because I conceive that the variations of earnings in the general number not to be very great.—Provisions are pretty much on a par; and few of them more than work to live,

L E T T E R XIII.

**T**HE husbandry near *Norwich* is generally good. About *Earlham* farms rise from 50*l.* to 200*l.* a year; the soil a loamy sand with both marle and chalk under it. Lets from 14*s.* to 20*s.* an acre; average 16*s.*

The rent from *Norwich* to *Yarmouth* is about 14*s.*

The course of crops,

- |                               |                                     |
|-------------------------------|-------------------------------------|
| 1. Turnips                    | only 8 <i>lb.</i> and $\frac{1}{2}$ |
| 2. Barley or oats             | a peck ray-grafs                    |
| 3. Clover, 9 or 10 <i>lb.</i> | 4. Wheat                            |
| of seed; but if               | 5. Barley,                          |
| with ray-grafs,               |                                     |

This latter crop of barley is unworthy a *Norfolk* man. Another course is,

- |            |           |
|------------|-----------|
| 1. Turnips | 4. Pease  |
| 2. Barley  | 5. Wheat, |
| 3. Clover  |           |

They plough once for wheat, sow 3 bushels, and reap 2 quarters. For barley they plough thrice, sow 3 bushels, and reckon the average crop at 3  $\frac{1}{2}$  quarters. For oats

after turnips they stir as often as for barley, but if they sow them after wheat only once, which is a distinction I do not comprehend; why the land, when it is so run, should not be favoured as well as when clover is to be sown. They sow 4 bushels; the crop 4 quarters. For pease they give but one earth; of the white sort they sow 4 bushels, but of the grey only 2—never hoe them; the crop 3 quarters.

They give 4 earths for turnips, hand-hoe twice. They have a particular method of using them, they draw the lands alternately; draw one and cart the turnips on to a clover lay, then leave one, then draw another; and so on. Those they carry off they give to beasts for fattening, or to milch cows, with a crib of straw in the field; and the remainder of the crop they feed on the land with sheep, and sometimes with beasts.—The crops are in value, from 21s. to 4l. 10s.; average about 40s. fed off.

They mow the first and second growths of clover for hay; which they do not only on account of the hay, but under the experimental certainty of the wheat that succeeds being much better than after feeding:

I repeated

I repeated my enquiries on this head, to know if it was only a private opinion, or a general observation and practice; and I was answered the latter.

Buck-wheat they plough twice for, and always mow it for seed; then they dung the stubble, and sow wheat on one earth, in which method they never fail of good crops of that grain.

Carrots are not an uncommon crop here. They plough up the stubble designed for them in autumn, and on that ploughing manure with long yard dung, 10 loads an acre; which they turn in by a trench ploughing, with two ploughs, one a pair of horses, and the other following in the same furrow with 4. In *February* the seed is harrowed in. It is generally 2 months before the carrots come to the hoe; they have three hoeings given, at the expence of a guinea an acre. They take up the crop with a three pronged fork, as it is wanted, never flowing them for security in a house. I could find no clear idea of the quantity produced on an acre, nor of any other value than that of *1 s. 2 d. per bunch* of 120, as large as a man's wrist; which

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is the price of *Norwich* market. Barley is always sown after them.

The best farmers chop their stubbles for manure; but it is not general. All stack their hay at home.

They have good marle all over the country, but not much used. But Mr. *Henry Raven* of *Brammerton*, has introduced claying; he lays 70 loads an acre with great success.—The only use made here of marle is however a very good one; they form composts of it with earth, farm-yard dung, &c. and mixing them well together, spread it for turnips, and find very great benefit from the practice.

Asbes they use sometimes on strong wet land.

They do not fold their sheep.

Soot they lay on grass lands, and also on wheat in the spring; 30 bushels an acre, at 6*d.*: It does great service for one crop, and is sometimes of benefit to the succeeding one.

Malt-dust they use in the same manner; 40 bushels an acre, at 4*d.*

*Norwich* manure of all sorts they have for  $\text{£}5$ . a four horse cart load; they use much of it, and find it answers greatly.

Grass

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Grass land lets from 40s. to 3l. an acre; but about *Brammerton* at only 20s. An acre will, about *Norwich*, carry a cow through the summer; but at *Brammerton* it takes 1  $\frac{1}{2}$ . Dairies let at 3l. 5s. to 3l. 10s. a cow. At *Brammerton* they keep about a hog to every cow.

A dairy-maid will take care of 20 cows; some will undertake 30. The winter food of cows turnips, and straw in the yard chiefly.

Swine fatten to 16 stone.

Flocks of sheep at *Earlham* are from 300 to 600; but few at *Brammerton*.

The profit,

Lamb,	-	-	£.	0	7	6
Wool,	-	-		0	1	0
-----						
0 8 6						
-----						

The winter food turnips.

In their tillage, they reckon 6 horses necessary for 100 acres of arable land; use 2 in a plough, and do 2 acres a day, 5 inches deep. The price 2s. 6d. an acre. They cut much straw into chaff.

The time of ploughing stubbles for a fallow, autumn.

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They reckon, on hiring farms, that three rents will stock.

Freehold estates sell at 27 years purchase; copyhold 22.

Tythes are generally compounded.

Poor rates at *Brammerton* 2*s.* in the pound. At *Earlham* 1*s.* 9*d.* They are in both places doubled in twenty years.

Particulars of a farm at *Brammerton*.

100 Acres in all	36 Barley
90 Arable	18 Turnips
10 Grass	18 Clover
£.65 Rent	1 Man
5 Horses	1 Boy
8 Cows	1 Maid
18 Acres Wheat	1 Labourer.

### LABOUR.

For the harvest, 2*l.* 2*s.* and board.

In hay-time, 1*s.* 6*d.* and beer.

In winter, 1*s.* and beer at *Brammerton*; 1*s.* 2*d.* at *Earlham*.

Mowing grass, 1*s.* 6*d.* an acre and beer.

Hoeing turnips, 4*s.* and 2*s.*

Filling cart, 25*s.* per 120 loads.

First man's wages, 10*l.* 10*s.*

Second ditto, 6*l.* 6*s.*

Lad's,



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Lad's, 3*l.*

Dairy-maid's, 4*l.* 4*s.*

Other ditto, 3*l.*

Rise of labour in 20 years a sixth.

### PROVISIONS.

Bread, - - 1  $\frac{1}{4}$  *d.* per *lb.*

Cheese, - - 2  $\frac{1}{2}$

Butter, - - 7

Beef, - - 3  $\frac{1}{2}$

Mutton, - - 3  $\frac{3}{4}$

Veal, - - 3

Bacon, - - 6

Milk, - - 1 *d.* per pint.

Potatoes, - - 6 per peck.

Candles, - - 7 per *lb.*

House-rent, 4*l.* out of *Norwich*.

———— in ditto, 2*l.* 10*s.*

Firing in ditto, 40*s.*

———— in the country, 20*s.*

*Nockold Thompson*, Esq; of *Norwich*, has executed some experiments at *Earlham*, which will prove sufficiently how capable the country is of improvement.

When this gentleman began farming, his land yielded very poor crops, being all in extreme bad order. None of the fields produced

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produced more than 2 or  $2\frac{1}{2}$  quarters of barley; no wheat was grown, only rye, and that indifferent: nor did the clover or turnips amount in weight to half what he now gains. The following is the register of his fields.

No. I. *Five acres.*

1768.

Manured, 12 loads an acre, with a compost made of *Norwich* dung, marle, and earth, in equal quantities, and sown with barley; the crop very good.

1769.

This year it yielded coleseed; was hand-hoed like turnips, and weeded; the produce  $4\frac{1}{2}$  quarters *per* acre; sold for 10*l.* This practice of hand-hoeing coleseed cannot be too much commended; it is no where common.

1770.

Manuring for wheat.

No. II. *Nine acres.*

1768.

Yielded barley after wheat,  $3\frac{1}{2}$  quarters *per* acre.

1769.

Manured with compost as above: sown

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with turnips; carted half off, and the other half fed on the land: the crop would have sold, from the great scarcity, for from 5*l.* to 7*l.* an acre.

1770.

Buckwheat.

No. III. *Nine acres.*

1768.

Manured with the compost for turnips; half fed off as above; the value 2*l.* 10*s.* Some of them came to 14*lb.* weight.

1769.

Barley, 3 quarters an acre.

1770.

Clover mown; 3 loads of hay an acre at one cutting, 46*s.* a load.

No. IV. *Eleven acres.*

1768.

Manured as above with compost; and sown with barley: the produce 2  $\frac{1}{2}$  quarters an acre.

1769.

Again manured with ditto.—Clover, mown for hay, a load an acre.

1770.

Wheat; will be 3  $\frac{1}{2}$  quarters.

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No. V. *Twelve acres.*

1768.

Manured as above with the compost for wheat, on a clover lay. The produce 4 quarters an acre.

1769.

Barley, 2  $\frac{1}{2}$  quarters an acre.

1770.

Manured again with the compost, and sown with turnips; the crop very fine.

No. VI. *Eleven acres.*

1768.

Barley after clover, the crop 3  $\frac{1}{2}$  quarters.

1769.

Manured with the compost, and sown with turnips; the crop very good.

1770.

Oats; at least 5 quarters.

No. VII. *Eleven acres.*

1768.

A corky foil; manured with the compost for clover.

1769.

Pease, 2 quarters.

1770.

Manured for carrots and turnips; fine.

No. VIII. *Nine acres.*

1768.

A clover lay in 1767, manured with the compost for wheat; the produce 4 quarters per acre.

1769.

Barley, 2  $\frac{1}{2}$  quarters.

1770.

Manured with compost for cabbages and turnips; the crops extremely fine.

No. IX. *Seven acres and an half.*

1768.

Manured with the compost for turnips; the value 3*l.* an acre.

1769.

Barley, 2  $\frac{1}{2}$  quarters.

1770.

Clover, 3 loads an acre.

No. X. *Eleven acres.*

1768.

An old meadow broken up in 1766 for oats, and oats again in 1767; clover with them; marled the clover lay, 70 loads an acre; fed the crop with horses, cows and sheep.

1769.

Manured with the compost for wheat;  
the crop  $4 \frac{1}{2}$  quarters *per acre*.

1770.

Barley; a good crop.

No. XI. *Three acres and an half.*

1768.

Manured with compost for turnips; the  
crop very fine.

1769.

Lucerne in drills.

1770.

Ditto, manured with compost.

No. XII. *Seventeen acres.*

1768.

Barley,  $3 \frac{1}{2}$  quarters.

1769.

Clover; manured with the compost;  
the crop a load and half of hay.

1770.

Wheat; promises fair for 4 quarters.

No. XIII. *Seven acres and an half.*

1768,

Barley,  $3 \frac{1}{2}$  quarters.

1769.

Clover, 1  $\frac{1}{2}$  load. Manured with compost.

1770.

*Charlton* pease, and white ditto—the latter the best.

No. XIV. *Seven acres.*

1768.

Turnips, manured with compost; worth 3*l.* an acre.

1769.

Barley, 3 quarters.

1770.

Clover, 3 loads hay.

No. XV. *Eleven acres.*

1768.

Pease; white and grey: the white 3  $\frac{1}{2}$  quarters: the grey, 1  $\frac{1}{2}$ .

1769.

Manured with compost for turnips; the crop a fine one.

1770.

Oats, very good.

No. XVI. *Four acres and an half.*

1768.

Clover, 1  $\frac{1}{2}$  load,

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1769.

Manured with the compost for wheat;  
the crop 4 quarters.

1770.

Barley.

No. XVII. *Two acres and an half.*

The same as No. 16.

No. XVIII. *Eight acres and an half.*

1768.

Old pasture, marled; 50 loads an acre.

1769.

Pease, 3  $\frac{1}{2}$  quarters.

1770.

Wheat; will be 4  $\frac{1}{2}$  quarters.

No. XIX. *Five acres and an half.*

1768.

Pasture.

1769.

Ditto.

1770.

Pease—good.

All the preceding crops of wheat were manured with a dressing of malt combs or foot, in *February*, about 30 bushels an acre.—The smallness of the crops of barley must



must be striking; the wheat exceeds it. This is owing to following wheat, and also to half the benefit which barley usually receives from turnips, being transferred to the wheat, by the turnips being drawn and fed on the clover lays; and the wheat has also the superior advantage of the spring top dressing. It seems to appear from this register, that all the turnips ought to be fed on the land for the barley. But Mr. *Thompson's* marling and compost manuring has brought his farm into excellent order; and made it yield far different crops from what it did before.

## CARROTS.

### *Experiment, No. 1.*

Three acres of gravelly and sandy loam on chalk, and marle, were ploughed in autumn 1769, and again in *February*, upon which earth 10 loads an acre of long stable dung were spread, and turned in by trench ploughing, and the seed harrowed in; but it proved bad, and the season was very cold and unfavourable. They were long in the ground before sprouting;—but by two good hand-hoeings have gained a

fine appearance. I found them a very promising crop; they are to be hoed again.

### CABBAGES.

Four acres of a good light mixed loamy soil were ploughed at *Michaelmas*; again in *February*, and a third time in *March*. Upon this earth it was manured with the compost, 12 loads an acre, and turned in in *June*. The seed, 3 *lb.* was sown in a garden the middle of *April*. The sort, the great *Scotch* cabbage. The plants were pricked out when in 2 leaves, 6 inches square. The 20th of *June* they were transplanted into the field in rows 3 feet asunder, and the plants 18 inches distant. It was done by the slight mark left by the plough in striking every fourth furrow; and the rows are quite straight. This is a very easy way of planting, in saving the complex and troublesome exactness of a line, which is otherwise necessary on flat land. The appearance of the crop is very fine, and promises to yield at least 30 tons an acre, and the whole plantation is perfectly clean.

## LUCERNE.

*Experiment, No. 3.*

Three acres of a loamy sand with ouzing springs under it at the depth of 6 or 7 feet (unknown at the time of sowing) were cropped with turnips in 1768, well manured for. It was ploughed the beginning of *February*, and had two earths more before *April*, in the middle of which month it was drilled with lucerne in equally distant rows, 18 inches asunder; it was kept quite clean by hand-hoeing; and cut once, in *August*, which cutting was given to horses in the stable.

1770.

In *March* it was cleaned by hand-hoeing, at a very heavy expence. The latter end of *May* it was cut in portions for horses as before; but the crop not large—not near equal to clover at the first cutting. Had it been made into hay, the produce would have been about a load an acre.

The beginning of *July* cut it a second time; the produce the same as before; and after cutting it was again hand-hoed.

Began to cut it the third time the first of

*August*, at about a foot high. But I did not find it clean.

The produce may therefore be calculated at three cuttings, each giving a load of hay an acre, the quantity of which three loads eaten green by horses, will not be of less value than five loads of common hay: this is no trifling produce. But lucerne, unless it is kept as clean as a garden, never yields its full product: As Mr. *Thompson* cleaned it only by hand, he found the expences to over-balance the produce; I recommended the shim for the intervals, and to harrow it across to extirpate the weeds that come up in the rows; and he is determined to try that method.

## IMPROVEMENT OF MEADOWS.

### *Experiment, No. 4.*

Mr. *Thompson* found several of his lower grounds, called meadows, quite boggy; and yielded nothing but a cold sower grass, and rushes; the utmost they were worth was 10s. an acre. In the spring of 1768, he mowed the rushes twice, and then drained the whole by deep and wide cuts: after which, he manured the whole with the

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the uncovering of a marle pit, called here the *callow*, 30 loads an acre. Upon this manuring he sowed *Dutch* clover and *Suffolk* hay feeds, and harrowed and rolled them in: they sprung well; and the effect was very advantageous.

1769.

This year the rushes were again mown twice, and the drains opened. The improvement greater still.

1770.

This year above half the breadth was broken up, and there has been a very exact rule for deciding the value of the improvement. The whole piece was 45 acres; now only 20, and this 20 has fed exactly the same cattle that the whole did before: It could now be let for 30s. an acre.

### CLEARING AWAY WEEDS:

I mention this part of good husbandry to observe, that Mr. *Thompson* makes it a regular practice to mow all the weeds in his hedges, borders, ditches, &c. and also in the adjoining lanes, before they seed; and he finds his account in this excellent practice by keeping his farm clean.

## MARLE.

The marle dug at *Earlham* is rather hard, and like chalk on the first digging; but it breaks in pieces easily, and on being thrown into water will dissolve in a quarter of an hour and be soapy: if powdered, it effervesces immediately with vinegar: the colour is white, with a tinge of a reddish yellow. He finds that the deeper it is dug, the better it is. It destroys weeds almost at once, particularly ketlocks and poppies. These were common in his fields, but have disappeared since the marling. He lays from 40 to 70 loads an acre when alone, but generally mixes it with dung.

## NORWICH MANURES.

Mr. *Tompson* buys 400 loads of dung, &c. from *Norwich* every year, at the price of 1s. and he reckons the carriage 2s. 6d. more: he always forms it into a compost with marle, &c. Lays a bottom of marle; then a layer of virgin earth, then dung, both the *Norwich* sort and the farm-yard; and then covers the whole heap completely with

with marle. After laying some time, it is turned over and mixed well together.

He brings from *Norwich* stable-dung, and sweepings of streets; also the riddance of privies mixed with coal ashes; likewise hops from a brewhouse: and large quantities of foot and malt-duft for top dressings of wheat.

### COURSE OF CROPS.

This is particularly set forth in the table of fields given above: but Mr. *Thompson* has made one remark which should be mentioned. He finds that the barley after the turnips eaten last is always very poor, owing to being sown late. This has determined him to sow buck-wheat on such lands in future; and wheat after it. This observation I do not remember hearing so particularly remarked before; but it is certainly an evil attending a crop of late turnips; and the remedy here proposed will in all probability answer well on many soils: but clover must be harrowed in upon the wheat in spring, or that necessary crop is left out of the course.

## SWINE.

This gentleman observed that the meadows which he fed with his horses and cows, were eaten very uneven; much grass remaining untouched: this induced him to try swine in grazing them, and it has answered; they assist so well, as to keep the grass fed level: and he eats it in general with them close at *Michaelmas*, for the young crop in the spring to come the better. He likewise has fed them entirely on clover, but does not make it a constant practice, as it answers much better to mow that crop, where hay sells from *2s. 6d.* to *3s. 4d. per C. wt.* He keeps the lean ones in winter on turnips and malt grains. Proposes to fat on carrots and buck-wheat.

The following are the particulars of Mr. *Thompson's* farm when got in perfect order.

200 Acres in all	50 Swine
170 Arable	3 Men
30 Grass	3 Boys
14 Horses	2 Maids
27 Cows	8 Labourers
12 Young cattle	30 Acres wheat
60 Sheep	40 Barley



10 Oats	4 Cabbages
10 Pease	3 Lucerne
30 Turnips	7 Sainfoine
30 Clover	5 Coleseed.
6 Carrots	

It cannot be doubted but this farm will do excellently well for carrots—cabbages—lucerne—and sainfoine.—I have little doubt but Mr. *Thomson* will find those crops uncommonly profitable, and especially as he is in so good a system of manuring; sufficient to keep any farm in great heart.

The soil changes between *Earlham* and *Bracon Ash*; the further this way you move, the heavier the land grows—there being much more clay in this country than about *Norwich*. But they have various tracts of gravelly and sandy loams; and also loose wood-cock brick earths. It lets on an average at 15s. an acre. Farms rise from 16l. to 200l. a year; general average 120l. The courses,

- |                            |                              |
|----------------------------|------------------------------|
| 1. Turnips                 | 6. Barley                    |
| 2. Barley                  | 7. Trefoile and<br>ray-grafs |
| 3. Clover and<br>ray-grafs | 8. Wheat                     |
| 4. Wheat                   | 9. Oats,                     |
| 5. Turnips                 |                              |

The oats come in very badly, and must do mischief: the change from the clover to trefoile, is on account of the clover having of late years failed very much, but by introducing trefoile alternately, this evil is quite prevented.

For wheat they plough but once, sow 2 or 3 bushels an acre, and gain  $3 \frac{1}{2}$  quarters. For barley they plough thrice; sow 3 bushels, and get 4 quarters an acre. For oats they vary their tillage from once to three times; sow 4 bushels, and reap 5 quarters on an average. They give but one earth for pease; sow 3 bushels; sometimes dibble them in on a clover or trefoile stubble, in which way only 2 bushels are used; the crop on a general average 3 quarters.—They never hoe.

They stir four or five times for turnips; hoe them twice, and use them all ways; the value about 40 s. an acre. They mow their clover twice; the first cutting yields about 2 loads of hay an acre, the second one: some leave the latter for seed.

Buck-wheat they sow as a preparation for wheat, 6 pecks *per* acre; the crop  $3 \frac{1}{2}$  quarters. The price varies; it is often  
higher

higher than barley; but the rate of that grain is the common rule.

Marle is not regularly found in this country; when they can get it, they lay from 80 to 100 loads an acre, and find it a very great improvement of light lands.

The best farmers chop their stubbles for manure; but many neglect it: all stack their hay at home, and most of them bring dung from *Norwich*, though 7, 8, or 10 miles off.

Plashing hedges quite unknown here; they cut off *all* the live wood, when they repair.

Good grass land will let at 20s. an acre: they apply it both for grazing and the dairy. An acre and quarter will carry a cow through the summer: they give 6  $\frac{1}{2}$  lb. of butter each *per* week; and a good one 6 gallons of milk a day. The total produce 4l. 15s. a year. The winter food straw and turnips, and a little hay in spring. In the nights they keep them in the yard, but in the field by day.

The graziers buy *Scotch* beasts chiefly; though some home-bred ones: If they give 5l. and keep them a year on grass and turnips,

nips, they do not more than double their money.

Their swine fatten to 16 stone. Flocks of sheep rise only to 100. In autumn they buy in lambs; and sell them in spring. They turn them first into the stubbles; after which they put them to turnips; they buy at 7s. and sell at 11s.

In their tillage, they reckon 8 horses necessary to 100 acres of arable land; use 2 in a plough, and do an acre a day: which quantity is a great falling off from that performed so little a way from them. They plough 3 inches deep: the price 2s. 6d. an acre; which is as low, as where they do 2 acres a day. They very seldom cut any straw into chaff. Their stubbles they plough up for a fallow in autumn: use only wheel ploughs.

In the hiring and stocking farms, they reckon 300*l.* necessary for a farm of 100*l.* a year: for those who have cash enough for 60*l.* a year, are sure to hire an hundred—a mistake much complained of by landlords.

Land sells at 32 years purchase. Tythes

are compounded; they pay 2s. 6d. or 3s. in the pound.

Poor rates, 2s. to 3s. in the pound; they are doubled in 20 years. The employment of the poor women and children, spinning wool. All drink tea twice or thrice a day.

Most of the farmers have leases.

Rev. Mr. *Howman*, of *Bracon Ash*, to whom I am obliged for the preceding particulars, has tried *Reynold's* cabbage turnip on strong clay land: It came to as great a size as common turnips on the best land, but grew so forked, and entwined its roots about so much earth, that half the crop was lost. Cows eat them after a little difficulty.

Turnip cabbages he also cultivated on a strong clay soil; the seed was sown the beginning of *April*: the latter end of *May* the strongest plants were drawn out to plant half a rood. The beginning of *July* they were again pricked for another rood. The seed bed itself was also half a rood—and what is remarkable, proved the finest of the three. This experiment is very curious, for it seems to prove a point never recom-

recommended by any of the cultivators of cabbages, *viz.* that it is more advantageous to sow where the plants are to remain, than to transplant them from a bed. This might easily be tried, and probably would be found a very good way of cultivating them.

Horses, cows, and sheep were turned in, who fell at once on them, and eat the crop clean up; they all seemed to like them exceedingly. Some were left to the spring, to discover how long they would last. The beginning of *January* was a week's sharp frost without snow, which left the plants a mere rotten pulp. They did not come to a larger size than common turnips; but were much heavier than those of an equal size.

This gentleman, on a strong clay soil of 16s. an acre, gained the following crops:

Wheat, 3  $\frac{1}{2}$  quarters.

Oats, 6 quarters.

Pease, 3 quarters.

Mowed from 2 to 3 loads of hay from his pastures. But his management was very perfect, for he kept his fields under a constant manuring, from compost heaps,

made in layers of dung and earth, and well mixed together.

He attributes his good success with his grass lands, in some measure to mowing off all the weeds and leavings of his cattle, when they were fed.

*Thomas Bevor*, Esq; of *Ethel* in this neighbourhood, has for some years kept part of his estate in his own hands, and cultivated it in a very complete manner; pursuing several practices not common in this country, which he has found of particular utility.

The course which he adheres to in preference to all others, is;

- |            |           |
|------------|-----------|
| 1. Turnips | 3. Clover |
| 2. Barley  | 4. Wheat. |

For his turnips he ploughs 4 to 6 times; they are worth on an average 3*l.* 3*s.* an acre; when he draws them he has generally 40 great cart loads an acre: feeds his horses on them to great advantage:  $\frac{1}{2}$  an acre will winter a cow. His barley yields 5  $\frac{1}{2}$  quarters an acre: he ploughs 5 times for it; sows 3 bushels an acre. The clover produces 3 loads of hay, at 40*s.* a load; and wheat upon an average, 4  $\frac{1}{2}$  quarters: he

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he sows 2 bushels; once tried 6 pecks, but it was the worst crop he had. These crops are all great, and could not be gained unless the management was excellent.

Turnips,	-	-	£.3	3	0
Barley,	-	-	5	10	0
Clover,	-	-	6	0	0
Wheat,	-	-	9	0	0
			<hr/>		
Total,	-	-	23	13	0
			<hr/>		

Or *per acre per ann.*      5 18 3

I do not think that common husbandry admits any thing more profitable than this. We ought to attend particularly to the management that ensures such noble crops: it consists chiefly in a very spirited conduct respecting manures.

He is principally solicitous to raise large quantities of farm-yard dung, as the cheapest and readiest method of improving a farm. For this purpose he stacks all his hay at home, ready to be consumed in the yard—he chops his stubbles, 25 acres, and carts them in for litter—he clears the lanes, &c. of fern, rushes, &c. getting 7 or 8 waggon loads yearly; all which he applies to the same use as his stubble. And one point,



point, in which he is quite peculiar, is the raking together all the leaves that fall in his park; he employs women in this business, they load the carts with large fans; the whole expence of raking, loading, carting, &c. is 6*d.* a load. He annually collects 200 loads; they are spread about the yard, and the cattle tread them into one general hard cake, which, receiving the dung and urine all winter, converts into as rich a manure as any in the world. By these exertions of excellent management he raises annually 1400 large loads of dung; made by

20 Cows	11 Horses
14 Young cattle	40 Swine.

These confined the winter through, also 20 horses joisted on hay, with liberty of running in and out to the park at pleasure, in all 105 head of cattle—but swine reckoned, we should not call them more than 85, which is  $16 \frac{1}{2}$  loads *per* head. A great quantity, considering that 20 horses run out at pleasure. Mr. *Bevor* carts these 1400 loads from his yard on to heaps, preparing layers of pond mud, ditch earth, ant-hills, wash sand, &c. &c. the dung

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is thrown on them, and then more layers of earth, &c. In this work, he is attentive to keep the carts off the heaps; they shoot down their loads by the side, and men are ready to throw them up with spades. He follows this method to prevent the carts driving on to the heaps, which he thinks press them too much, and thereby prevent the fermentation which rots the compost. He has tried the dung alone; and has found from long experience, that this mixture will do more benefit upon a given quantity of land, than the dung alone; and be superior to a much greater degree, than the amount of the expences. He mixes the 1400 loads of dung with 600 of earth, &c. &c.—using annually 2000 loads. The quantity of the compost, after being well mixed together, that he spreads on an acre, is 12 loads, every other year.—

Besides this general system, which is undoubtedly excellent, he attends to other ways of improving his land.

### *Experiment, No. 1.*

Buck-wheat he has sown on a strong clay land as a preparation for wheat, after  
four

four ploughings : it was partly fed off by cattle, and what remained ploughed in the end of *July*, and after two stirrings more, wheat sown : the crop was 5 quarters an acre.

*Experiment, No. 2.*

An ordinary pasture was broken up and dibbled with pease ; the crop 5 quarters an acre ; the old turf was so rotten that Mr. *Bevor* intended wheat ; but being prevented, he sowed it with buck-wheat, 1 bushel an acre ; after which he sowed wheat, and had 6 quarters an acre. This was succeeded by turnips ; and it was laid down with grasses among the following barley.

*Experiment, No. 3.*

Soap ashes he has used on grass land, with such success, that land let at 5 s. manured with 20 loads an acre, was improved by them to a guinea an acre rent.

*Experiment, No. 4.*

Ant-hills he tried once for manure, mixing them with dung. A large quantity was formed into a heap, which he turned over several times, till the whole was one

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uniform mass of putrid mould: it was quite black and moist: this he spread on grass, and found the benefit of it fully equal to that of dung alone: and it has lasted longer than he apprehended that manure would have done.

### *Experiment, No. 5.*

Mr. *Bevor* tried the burning of clay: it was of a hard strong kind: he formed a heap with whins, rushes, stubble, and some turf; the clay calcined into bricks, which were broken and spread on the land: few ashes. But the benefit has been very little.

In preserving all the urine which runs from the farm-yards, &c. this gentleman is very attentive; he has a small well to which it is conducted, with a pump fixed as fast as it fills, it is carted away in such a machine as they water the roads about *London* with. He sprinkles the worst grass with it, and finds it the means of presently converting it into the best. This is an excellent practice, and cannot be too much recommended.

*Experiment, No. 6.*

Hearing it asserted that young swine would not do well on clover, he ordered some sows and pigs to be turned all day long into the clover field with his other hogs; they were so, and no ill effect arose; they were as well, and throve as fast as before. He has since adhered to the practice, and whenever a clover field, or part of one, is fed, *all* his swine, without distinction, have it.

This gentleman's farm consists of

530 Acres in all	32 Wheat
400 Grass	22 Cows
130 Arable	20 Oxen
£.400 Rent	20 Young cattle
40 Acres of grass mown	180 Sheep
32 Turnips	100 Horses
32 Barley	10 Colts and foals
32 Clover	40 Swine.

The number of horses is owing to his taking many joint ones from *Norwich*, at 2 s. 6 d. a week, the year through; giving them hay in winter, for them to go to at pleasure.

He keeps none but polled cows; that is,

without horns; on account of his plantations and hedges; and he finds they give more milk than others.

His sheep are the *Lincolnshire* breed, of which he finds he can keep in proportion to the *Norfolk* ones, as 3 to 5. If 500 of the latter, he can keep 300 of *Lincolnshire*, and the latter will pay him much better than the 500 *Norfolks*. He clips 6*s.* worth of wool from each.

#### *Experiment, No. 7.*

In planting, Mr. *Bevor* finds that *Scotch* firs, in 18 years, are worth 2*s.* 6*d.* A plantation of his taken through are of that value.

#### *Experiment, No. 8.*

A whole plantation of 50 years growth, worth 50*s.* on an average: they stand 20 feet square—which is 108 to an acre,

#### *Experiment, No. 9.*

In another plantation on a moist sandy loam, larches of 18 years growth, are worth 3*s.* 6*d.*: Spruce firs among them not half so good, which Mr. *Bevor* attributes

butes to their being trimmed up; others on same soil and growth, not served so, are almost double the size.

— *Rogers*, Esq; of *Ethel*, has taken a farm, which he is improving, particularly by claying, and other manuring. He has three acres of cabbages. He ploughed for them five times, transplanted from the seed bed (sown in *March*) in *June*, in rows 4 feet by 2 from plant to plant; and he has observed that the larger the plants at setting out, so much the better the crop; which is a matter of importance. I observed a great difference in the field; but it was owing alone to the plants being larger: they promise well, and are kept perfectly clean.—The following are the particulars of Mr. *Rogers's* farm.

175 Acres in all	10 Horses
150 Arable	2 Men
20 Grass	12 Labourers.
£. 105 Rent	

— *Berney*, Esq; at *Bracon Ash*, has made great improvements by planting land of 20 s. an acre.

Oak, of 50 years growth, are worth

I 4

15 s.

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15*s.* each: they stand 15 feet square; this is 180 on an acre.

Larch, in 18 years, (20 from the seed) are worth 6*s.* each: they grow out of underwood that pays 20*s.* an acre. Some few of 20 years, worth 15*s.* each. Silver firs in the same wood not quite so large, but they beat both the spruce and *Scotch*. They all stand 15 feet square in the underwood.

In another plantation without underwood, *Scotch* firs, of 18 years, are 2*s.* 6*d.* each: they stand 8 feet square; which is 680 on an acre, or 85*l.*; that is, 4*l.* 14*s.* *per acre per annum*, exclusive of thinnings.

An adjoining plantation of spruce, of the same age and distance, are worth 4*s.* each, which is 136*l.* *per acre*; or 7*l.* 6*s.* *per acre per ann.* from first planting, and exclusive of thinnings. No husbandry will equal this. A man who would plant for profit must not regret land of 20*s.* an acre.

*Weymouth* pines, in 18 years, much larger than *Scotch* firs of 22 years.

Mr. *Berney* has found it best to trim up the firs.



# THE FARMER'S TOUR

It is a pity that they find it so difficult to  
get on their feet. I have seen many of them  
in the streets of London, and I have seen  
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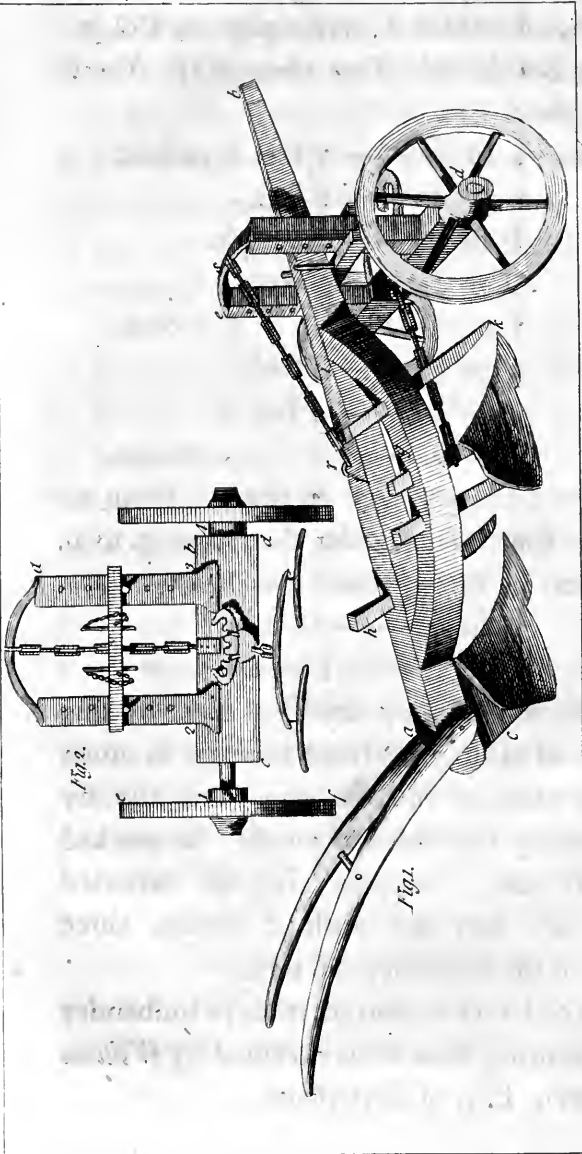


Plate VI. Fig. 1. represents an improvement made by Mr. *Berney* in the double plough, of which I gave a plate in Vol. 3. of my *Six Months Tour through the North of England*.

From a to b. — 7 feet 6 inches.

c to d. — 6 feet.

b to d. — 3 feet 6.

h to i. — 3 feet.

f to g. — 6 inches.

e to b. — 2 feet.

c to k. — 4 feet 8.

r to s. — 31 inches.

Fig. 2. the carriage in front. From 1. to 2. is four inches wider than from 3. to 4.

From a to b. — 20 inches.

c to d. — 28 ditto.

e to f. — 26 ditto.

Two horses only are used in it, by this means of raising the front carriage so much higher than in the old one, and also by shortening the beam so much. It worked against the common *Norfolk* wheeled ploughs; and did with 2 horses, three acres in the time they did two.

Several very important trials in husbandry and planting have been executed by *William Fellowes*, Esq; of *Shottesham*.

## 122. THE FARMER'S TOUR.

### *Experiment, No. 1.*

To discover which was the best manure for turnips, yard dung or earth mixed with lime, a field was divided into two parts: one half dunged with 12 loads an acre, directly from the yard to the land; the other half, 30 loads an acre of earth mixed with 3 chaldron of lime. The former part turned out much the best.

### *Experiment, No. 2.*

Wheat Mr. *Fellowes* drills in equally distant rows, 18 inches asunder, and hand-hoes it twice, at 2 s. 6 d. an acre each time. I viewed it with great pleasure, for not a weed was to be seen; it is calculated at 3  $\frac{1}{2}$  quarters *per* acre; which is a better crop than most broadcast hereabouts.

There was likewise some wheat drilled with 4 feet intervals. I examined the ears, and found them not at all larger or heavier than those of the 18 inch rows.

### *Experiment, No. 3.*

Some seed of the great *Scotch* cabbage was sown the 10th of *March*; and in *May* transplanted into the experiment field, in  
squares

squares of 2 feet 6 inches, upon a well-tilled turnip loam, manured with 20 loads of dung an acre. I found them very fine, and perfectly clean; turnips were on one side of them, so that Mr. *Fellowes* will be able to see which will last longest good—and yield the best crop.

*Experiment, No. 4.*

In 1765, two acres of a light loamy soil, manured with 12 loads an acre yard dung, were sown with carrots the beginning of *April*, 4 *lb.* of seed *per* acre. They were hand-hoed thrice, at the expence of a guinea an acre.

They were taken up with forks as wanted; the product 20 loads an acre, 30 bushels each, or 600 bushels; which, at 1 *s.* a bushel, is 30 *l.* *per* acre. They were all used for horses, kept all winter in a small dry grass close; the carrots were thrown about the field. No horses could do better, or be freer from distempers,

*Experiment, No. 5.*

In 1766, four acres of the same soil were ploughed four times, the third time  
in

in the trenching manner, one plough following another in the same furrow, gaining a depth of 10 inches; after which it was ploughed in the common manner, and 4*lb.* per acre of seed harrowed in: they were hoed thrice, at a guinea an acre. The crop was used in the same manner as that of 1765; and was as good a one. Some cows being turned in with the horses, the butter received an higher colour, but was improved in flavour: none could be finer.

*Experiment, No. 5,*

In 1767, four acres in the same field were sown, upon the same preparation as the preceding year. They were given to cows and horses in the former manner, and turned of incomparable use. Numbers of the carrots weighed 3 or 4*lb.* but the general average was not more than 1*lb.* They were set out at 8 inches distance from each other in general; but small spots failing, that distance, Mr. *Fellowes* apprehends, was increased in the whole field to 10 or 11; but I shall suppose to 12. There would then be 43560 carrots on an acre, which,  
at

## THROUGH ENGLAND. 125

at 1 *lb.* each, amounts to 19 tons 9 *C. wt.* and supposing a bushel to weigh 56 *lb.* it is 778 bushels on an acre, which at 1 *s.* comes to 38 *l.* 18 *s.*; at 6 *d.* only, they come to 19 *l.* 9 *s.* *per* acre. And to shew the undoubted greatness of the value of a carrot crop; allow 2 square feet to each carrot, which would make them all far greater than 1 *lb.* weight; the crop in such case, at 6 *d.* a bushel, would be 9 *l.* 14 *s.* 6 *d.* an acre. But I know from various experiments of my own, that they will pay in feeding cattle 1 *s.* a bushel.

### *Experiment, No. 6.*

In 1768, four acres more of the same soil were sown with carrots, the culture, produce, and expenditure, the same as the year 1767.

### *Experiment, No. 7.*

In 1769, Six acres were sown; the success the same.

### *Experiment, No. 8.*

This year, 1770, the crop is four acres, in the same experiment field; 6 *lb.* *per* acre

of seed were sown; the crop is regular, clean, and very fine. Mr. *Fellowes* is clear that they will come to 1 lb. each on an average; of which I have not any doubt.

Barley has been constantly sown after the carrots; and respecting their value as a preparation for that grain, he is very clear in his account: the crop is always much superior to that which follows turnips drawn; but something inferior to such as succeed turnips fed on the land.

#### *Observations.*

These experiments on carrots are very valuable; the facts to be drawn from them are perfectly satisfactory, in being the result, not of a single vague trial or two, but a regular prosecution of an established husbandry. The carrot crop, though small, is as certain a one as any other on Mr. *Fellowes's* farm. It evidently appears that they yield a very considerable quantity of produce, and that produce of uncommon use in feeding both horses and cows.

But the idea of the value of a crop is throughout this country extremely indeterminate, and below the truth. From



four to six or seven guineas an acre, have been thought high prices. This strange circumstance has been owing to two causes; first, the price at *Norwich*, which is not half what I experimentally know them to be worth in feeding cattle; and, secondly, to a want of keeping minutes of the consumption.

Carrots are worth 1 s. a bushel of 56 lb. in feeding horses or oxen; or in rearing, feeding, or fattening swine: But the clear method of knowing their value is to buy a lot of hogs or oxen, fat them with so many hundred bushels of carrots, then sell them: the value of the carrots is decided at once.

Let us calculate the profit of the preceding crops.

*Expences.*

Rent, tythe, and town charges,	£.1	1	0
Five ploughings and harrowings,	0	16	0
6 lb. of Seed,	-	0	8
Sowing,	-	0	1
12 Loads dung, directly from yard,			
suppose	-	1	10
Hoeing,	-	1	1
Taking up, suppose	-	0	12
Carting from field, suppose		0	5
		<hr/>	<hr/>
		5	14
			0

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## Produce.

778 Bushels, at 1s.	-	-	£.38	18	0
Expences,	-	-	5	14	0
Profit,	-	-	33	4	0

If each carrot is only  $\frac{1}{2}$  lb. it is

389 bushels, which, at 1s. is	19	9	0
Expences,	-	-	5 14 0
Profit,	-	-	13 15 0

And lower than this it cannot reasonably be estimated. This profit on a crop which keeps so much stock, and consequently raises a prodigious quantity of dung, at the same time that it prepares the land for barley, ought to induce the farmers to cultivate it upon a large scale: they would assuredly find it the most beneficial article in *British* husbandry.

Rents about *Shottesham* rise from 8s. to 20s. an acre; the average about 14s. The general course is,

1. Turnips, worth 2l. 2s.
2. Barley, 3  $\frac{1}{2}$  quarters *per* acre.
3. Clover, worth 3l. 3s. an acre.
4. Wheat, 2  $\frac{1}{2}$  quarters.

But it is found pretty generally that clover fails much more than formerly: it comes up very thick and fine, but dies

dies away in the winter—Mr. *Fellowes*, by means of more spirited management, gets better crops; his wheat  $3\frac{1}{2}$  quarters; his barley 4, and has up to 6; and his turnips 2*l.* 10*s.* No farm can be neater, or carry greater marks of its being in the hands of a gentleman. He has grass borders 15 feet wide around all his fields, which are mown for hay and kept level, and free from ruts: and either single or double rows of elms run along many of them, for the pleasure of walking in the shade, besides the beauty of the object. I observed also, that the fences throughout his farm were in excellent order; regular; and free from gaps and rank weeds.

Mr. *Fellowes* has given yet greater attention to planting than to husbandry, and has tried various trees, some years ago, so that he is now able clearly to judge which is the most profitable.

*Experiment, No. 9.*

A plantation of *Scotch* firs of 45 years growth, 20 feet square, on land of 15*s.* an acre, are now worth 20*s.* each on an average. At that distance there are 108 trees on an acre, or 108*l.*; which is 2*l.* 9*s.*

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*per acre per ann.* from the first planting, exclusive of thinnings, which would more than double it. But the grafs under the trees would have let, for many years past at 7*s.* an acre.

### *Experiment, No. 10.*

Another plantation of *Scotch* firs, 38 years growth, standing in rows 14 feet wide and 10 in the rows, are now worth 12*s.* on an average. This distance gives 300 on an acre; and at 12*s.* come to 180*l.* or 4*l.* 14*s.* *per acre per annum*, besides thinnings. The rent of the land 15*s.*; poor rates 1*s.* 3*d.* in the pound; and tythe, till 20 years old, 5*s.* an acre; the grafs under them now 5*s.* an acre. It is sufficiently evident that no husbandry can equal this.

### *Experiment, No. 11.*

Chestnuts in 38 years\*, on the same land, standing 14 feet by 10, are worth 15*s.* each. This is 225*l.* *per acre*; or 5*l.* 16*s.* *per acre per annum*, besides thinnings.

### *Experiment, No. 12.*

*Scotch* firs in 38 years, on the same land, measure 17 feet of timber on an average, for

\* Note that all these ages are from the seed; not the planting.

for which Mr. *Fellowes* has been offered 11*d.* a foot; that is 15*s.* 7*d.* a tree. They stand 14 feet by 10. An acre would therefore be 233*l.* 15*s.*; or 6*l.* 3*s.* *per acre per annum*, besides thinnings. These trees are 60 feet high.

*Experiment, No. 13.*

On the same land larch trees, of only 31 years growth, are as large as the firs of Experiment, No. 12. which shews that the larch is a much quicker grower. Spruce by them, not so large as either. The pinaster of 38 years, larger than the *Scotch*: The cedar of *Lebanon*, of the same age, would now cut into planks 12 inches wide.

*Experiment, No. 14.*

A very striking comparison between the larch and the spruce fir, was tried by planting an old gravel pit levelled, surrounded by a plantation of *Scotch* fir, with those two sorts in alternate rows. The larch is from 6 to 12 feet high; whereas the spruce is but 2 feet on an average.

*Experiment, No. 15.*

A large plantation of many acres of a poor gravelly land, at 8*s.* an acre, containing *Scotch* and spruce firs and larches, is

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now 16 years old; they are in squares of 10 feet, and are worth;

The *Scotch*, 2*s.* 6*d.* each.

The spruce, 3*s.* 6*d.*

The larches, 4*s.* 6*d.*

At ten feet, there are 435 trees on an acre.

The *Scotch*, at 2*s.* 6*d.* come to 54*l.* 7*s.* 6*d.*; or *per acre per annum*, 3*l.* 7*s.*

The spruce, at 3*s.* 6*d.* to 76*l.* 2*s.* 6*d.*; or *per acre per annum*, to 4*l.* 15*s.*

The larch, at 4*s.* 6*d.* to 97*l.* 17*s.* 6*d.*; or *per annum*, 6*l.* 2*s.*

All three exclusive of thinnings.—Suppose we calculate these at no more than paying the rent, tythe, and town charges; and that the larch, in 20 years, come only to 100*l.* which is however under the truth; let any one calculate the profit of hiring land on a 21 (or more) years lease, and immediately planting. In what other application of the land can such great profit be made, as gaining 6*l.* an acre without any risque, and almost without any expence? It is true, such a conduct cannot, like the culture of corn and grafs, be general, for reasons obvious to every one—but as far as the whole demand of any neighbourhood extends, it is profitable to execute it.

it. Such a demand is every where very great, for the use of rails, spars, beams, board, planks, &c. &c. according to the age of the trees; and great quantities of these are perpetually importing from the *Baltic*. So far, therefore, as the demand extends, it is highly adviseable to plant these trees.

Suppose 5 acres of larch planted every year; at the end of 16 or 17 years, five acres will every year be cut down, of the value of 500*l.*: from that day a regular product of 500*l.* a year is gained from the application of 100 acres of land. Let to a tenant, these 100 acres produce 40*l.* a year; but planted, they produce 500*l.* a year. What an amazing difference!

Suppose a single acre planted every year, after the expiration of 18 or 20, to cut annually 100*l.* a year from only 20 acres, which let, would yield but 8*l.* a year. How beneficial a conduct.

It should here be observed, that the larch is valued the same as the *Scotch* fir; but the best authorities tell us, the timber is one of the most useful known; probably, therefore, the value of it would turn out greater than the supposition in these experiments.

*Experiment, No. 16.*

Sixteen *Scotch* firs and two pines raised from seed, sown between *Michaelmas* 1732, and *Lady Day* 1733, were measured *June* 7, 1768. The measure is exclusive of the bark, for which 6 feet *per* load was allowed; the bark being very thick they were valued at 9*d.* a foot. They being full of sap. The 306 feet come to 11*l.* 9*s.* 6*d.* The trees stand in a row at unequal distances; but are on an average at 15 feet.

No. 1.	<i>Scotch</i> fir	—————	22 feet.
2.	Ditto.	—————	13
3.	Ditto.	—————	21
4.	Ditto.	—————	26
5.	Ditto.	—————	9
6.	Ditto.	—————	22
7.	Ditto.	—————	16
8.	Ditto.	—————	10
9.	Ditto.	—————	22
10.	Ditto.	—————	18
11.	Ditto.	—————	15
12.	Ditto.	—————	22
13.	Ditto.	—————	22
14.	Ditto.	—————	8
15.	Ditto.	—————	18
16.	Ditto.	—————	16
			280



Brought over,	280 feet.
17. Pinafter. —————	11
18. Ditto. —————	15
	<u>306</u>

A beech sown at the same time, measured in *January* 21, 1769, 19 feet 7 inches.

Mr. *Fellowes* has had both the boughs and seed of the red deal from *Norway*, and he finds that it is the *Scotch* fir.

In a regular planting and cutting down a given quantity of land, it would be advisable, I should apprehend, to plant the old land again, which would save grubbing up the stumps and roots, which in rotting would turn to a rich manure for the new trees.

Plane trees Mr. *Fellowes* has planted; and he finds them to thrive amazingly in low moist situations. It will in such, grow much faster than the poplar. One he has of 30 years growth that will cut into planks 20 inches broad; but so vast a size he attributes in some measure to its standing on the edge of a ditch through which the drainings of a farmer's pigsties run. Poplars, in some parts of the kingdom, are planted in low situations to the exclusion of every thing else: it is of consequence there-

fore to know that the plane will do better ; and in beauty it infinitely exceeds that ragged, crooked, unsightly tree, the poplar.

Mr. *Fellowes* in general recommends the larch as preferable to every other tree that he has tried ; and which will pay a planter much greater profit than any of the rest. As to the method of cultivating them, or any firs, he is of opinion that the land should be cropped with turnips, and the trees set about the 10th of *April* following ; but if that season is omitted, late in *August* will do. They should be 2 years old, and set at 4 feet square. For four years it will be advisable to hand-hoe the land about them twice a year, which will cost 3 s. each hoeing : after that there will be no further expence\*.

— *Gooch*, Esq; of *Shottesham*, has cultivated lucerne with success: He has kept two horses through a summer on the produce of only a rood of good land.

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\* Mr. *Fellowes* in the corner of one of his fields has a rustic temple of a design which cannot but please. It is the imitation of a round hay-stack, thatched from the ground. I do not remember seeing one before. It is a stroke of pure taste.

Suppose the summer 26 weeks,  
and the horses at 2 s. 6 d.;

this amounts to *per* acre £.26 0 0

Lucerne is a plant that will ever be found to answer in an uncommon manner on good soils.

From this part of *Norfolk* I took the road to *Yarmouth* through the hundred of *Flegg*; which I had been told was cultivated in a most complete manner.

Farms in this country rise from 50 l. to 500 l. a year; but are in general about 120 l. The soil is various, but chiefly a fine, mixed, dark good loam; lets at 15 s. an acre. Their courses of crops most common, are,

- |            |            |
|------------|------------|
| 1. Turnips | 4. Wheat   |
| 2. Barley  | 5. Barley. |
| 3. Clover  |            |

*Also,*

- |   |                  |
|---|------------------|
| 1. Turnips                              | 4. Buck-wheat or |
| 2. Barley                               | pease            |
| 3. Clover and ray-<br>grafs for 2 years | 5. Wheat.        |

This is an excellent course. They plough but once for wheat; sow 3 bushels, and gain 3  $\frac{1}{2}$  quarters an acre. For barley they stir thrice, sow 3 bushels, and reckon

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the average produce 4 quarters. They get 5 quarters of oats, and 10 have been known. For pease they plough but once; sow 3 bushels, and get  $2\frac{1}{2}$  quarters *per acre*.

They give four or five earths for turnips; hoe them always twice. Many are drawn for the fattening of beasts, some in sheds, some in bings in the farm yards, and some on dry grass fields; but they reckon them to fatten best and quickest in sheds; but one evil is, they wont drive so well in this method. They buy at the *Michaelmas* fairs both home bred and *Scotch* beasts, almost lean; they put them to turnips, and sell in *April*. If they buy at 5 *l.* they will sell at 8 *l.* 8 *s.* or 9 *l.* They give no hay with the turnips; or a very trifle, but they have straw at command. Three rood of turnips will fatten a beast of 45 stone, or 6 *Norfolk* wether sheep.

The clover crop is both mown once—twice—and also fed wholly. These variations depend on the wants of the farmer; but it is generally agreed among them, that the wheat which follows the crops cut for hay, are better than those which succeed the crops fed. Tares are cultivated by  
some

some farmers for soiling their horses with green in the stable; also for seed; and they sow wheat after them.

In their manuring they are very good and attentive farmers. They chop their stubbles for littering; and their hay they stack all at home. Marle is used at a very great expence. It is brought from *Norwich* by water to *Yarmouth*, and from thence, by many farmers, to *Ormsby*, &c. from 4 to 7 and 8 miles by land. The expence is 3*l.* for a keel load of 18 cart loads, each 1  $\frac{1}{2}$  tons, and the land carriage is 4*s.* a load more; so that the whole price is 7*s.* 4*d.* per cart-load. The greatness of this expence prevents their laying on such large quantities as in other parts of *Norfolk*. Clay they likewise use; lay 40 loads an acre, and find it lasts 20 years. They make composts of clay or mould, farm-yard dung, and sea sand; covering the whole heap with the latter; but in one circumstance they are very deficient, they never mix them by turning over.

Malt-dust they sow on clover, and find great benefit; about 4 quarters an acre.—*Yarmouth* dung they buy at 2*s.* a load.

They

They have scarcely any meadow or pasture in the country; their cows they feed on clover and ray-grass; an acre of which they reckon sufficient for the summer food of one. Good cows give 5 gallons of milk a day. They let their dairies at 4*l.* 4*s.*; and reckon that the hirers make 1*l.* 1*s.* to 1*l.* 11*s.* 6*d.* a head profit.

Swine fatten to 15 stone a head.

The number of sheep kept is very small; many farmers none at all; but those that do, buy chiefly wethers and year old lambs, and sell them fat within the year.

In their tillage, they reckon that 6 horses are necessary to 100 acres of arable land: they use 2 in a plough; and do an acre and half a day in general; but 2 acres in barley sowing; do not cut deeper than 4 inches on account of a poor barren sand below the surface, which is pernicious to their land. The price *per* acre 2*s.* 6*d.* The annual expence *per* horse they reckon at 6*l.* Their stubbles they begin to break up for a fallow about *Christmas*. They use none but wheel ploughs; which they reckon much the easiest and most expeditious;

ous: but if they want to plough up a very stubborn piece of land—or to cut deeper than ordinary, they use swing ploughs.

In the stocking farms they reckon 1500*l.* necessary for one of 300*l.* a year.

Land sells at 26 or 27 years purchase.—

Tythes are compounded in all sorts of ways, but the general rule is 3*s.* an acre.

Poor rates 1*s.*: Twenty years ago they were but 3*d.*: the employment of the women and children spinning wool: all drink tea; and some thrice a day.

The following are the particulars of a farm.

350 Acres in all	4 Men
300 Arable	1 Boy
50 Marsh	2 Maids
£.260 Rent	5 Labourers
17 Horses	60 Acres turnips
20 Cows	60 Wheat
40 Young	120 Barley
50 Fattening beasts	60 Clover.
on turnips	

They have throughout this country a machine which I have not seen any where else, which is a cart convertible into a wagon by adding at pleasure two fore wheels.

The

The farmers very sensibly remarked the danger that the filler horse is always in when a two wheeled cart is heavy loaded, either of being lifted up by loading too heavy behind, or having his back broken by a load too heavy before:—carts in harvest are of but little use from the danger of loading them freely on this account. These motives induced them to contrive this addition, which they have to many of their carts in harvest, rendering them as useful as waggons: They also use them on the road for carrying corn to market; they load them with 10 or 12 quarters of barley with the utmost ease, which is near as much as a waggon will carry: on the other hand, the fore carriage takes off with the greatest ease, and then the cart is ready for marle, dung, earth, &c.

Plate VII. Fig. 1. and 2. is a representation of one of them.

*John Ramey, Esq;* of *Ormsby* near *Yarmouth*, has executed some experiments in husbandry which deserve being known. Lucerne he tried in comparison with common husbandry. In 1763, he threw a close of 7 acres and an half of fine rich  
light



light land into three divisions; one of 3 acres of lucerne transplanted; one of half an acre of lucerne broad-cast; and one of three acres for common husbandry. The whole piece turnips in 1762, manured for. The three acres designed for transplanted lucerne were cropped in 1763, with *Charlton* pease, which were off the land time enough to give it three ploughings, and harrowings sufficient to make it perfectly fine; and the lucerne was in *August* set in rows 3 feet asunder, by 1 foot from plant to plant in the rows. It was kept clean of weeds by hand-hoeing, but came that autumn to nothing.

At the same time that the pease were sown on that piece, barley was sown on the other  $3\frac{1}{2}$  acres, broad-cast lucerne on the half acre, and clover on the 3. The barley yielded 5 quarters *per* acre, which quite destroyed the lucerne, but did no damage to the clover.

1764.

This year the transplanted lucerne was cut three times; it was horse-hoed four times, and hand-hoed thrice, at a great expence. But the product was small, not  
 I more

more than the three acres keeping two horses through the summer.

The clover was cut twice; the first time it yielded 35 C. wt. *per acre* of hay; the second 20 C. wt.

1765.

This year the lucerne was horse-hoed three times, and hand-hoed as often; it was cut thrice, and given to the horses in the stable: the product was something better than the preceding year, but not to the amount of keeping another horse.

The clover land was ploughed up, and yielded  $3\frac{1}{2}$  quarters of wheat *per acre*.

1766.

This year the lucerne declined; which Mr. Ramey perceiving, he did not attend to keeping it clean, so the weeds got the better of it.

The clover land, wheat stubble, was sown with barley; the produce 4 quarters *per acre*.

In this trial the common husbandry was beyond comparison more advantageous than lucerne; but in extenuation of the ill success of the latter, I must be allowed to observe that

that it was given up just when it was coming to perfection. For 3 acres of transplanted lucerne to keep 2 horses the *first year*, is extraordinary, and bid fair for great things: The second year it improved. There cannot be a moment's doubt of that improvement going on till it maintained 3 horses *per acre* at least: but all this depends on its being kept as clean as a garden. Mr. *Ramey*, disgusted at the vast superiority of the common husbandry during two years, might not sufficiently consider that the 2 first of transplanted lucerne are but preparatory: Certainly, if a comparison is not conducted for some time after a plant arrives at maturity, the conclusions drawn from it will not be decisive.

Mr. *Ramey* has this year a crop of the great *Scotch* cabbage. The field was under barley last year; it was winter fallowed, and the plants set the last week in *May* in rows 3 feet asunder, by 2 from plant to plant. The seed was sown the third week in *March*. The transplantation was performed by women only; 2  $\frac{1}{2}$  acres took one day of 6 women, and one day of 4, all at 8*d.* a day; the cost therefore 6*s.* 8*d.*

which is 2*s.* 8*d.* an acre. This is doing it very cheap, for 3 feet rows are closer than usual; from whence it is very evident, that the transplanting should always be done by women. None of the plants were watered: they have been horse-hoed twice, and hand-hoed as often. Mr. *Ramey* designs them for late spring feed, and has very judiciously sown an adjoining 2  $\frac{1}{2}$  acres with turnips; the whole field equally manured. This will enable him to judge which plant is the most profitable.

The following is Mr. *Ramey*'s common husbandry.

1. Turnips, worth 3*l.* an acre,
2. Barley, yields 4 quarters.
3. Clover, 3 loads of hay at 2 mowings.
4. Wheat, 3  $\frac{1}{2}$  quarters.
5. Barley, 4 quarters.

This barley being as good as the crop after turnips is surprizing. He always manures for his turnips; the first hoeing he gives with a machine, in which 7 share cut up the turnips in stripes; this he finds cuts the land deeper than the hand-hoe and though irregularly, yet the second hoe

ing in the common manner, leaves the crop perfectly even.

In the application of his clover crop, this gentleman puts it to one use that deserves great attention. He begins the second week in *May* to foil 20 horses with clover in the stable, and continues it till the wheat stubbles are ready to turn into: 7 acres feed 20 horses and 7 cows; the latter in a house, or rack yard, but drove twice a day to water:—also 5 calves—and as many pigs. The horses have neither corn nor hay.

Respecting the value of the crop, Mr. *Ramey* could not have his horses so kept under 8*d.* a day; but as the joisting price of the country is 2*s.* 6*d.* a week, I shall calculate from that.

20 Horses 17 weeks,			
at 2 <i>s.</i> 6 <i>d.</i>	-	-	£.42 10 0
7 Cows ditto, at 2 <i>s.</i> 6 <i>d.</i>	-		14 17 6
5 Calves ditto, at 1 <i>s.</i> 6 <i>d.</i>	-		6 7 6
5 Pigs ditto,	-	-	0 0 0
			<hr/>
			63 15 0
			<hr/>

Or *per* acre, - - 9 2 1

This is one of the most curious experiments I have met with; for though it is a

practice that has been often recommended, yet I never met with an accurate account of what a given quantity would do. It is from hence clearly evident, that this method of using clover is by far the most beneficial: the quantity of dung raised, where there is litter at command, is immense; much more than in winter, from the cattle making so much more urine when fed on green food. I should value this article at 4 or 500 loads of manure from the above cattle, at 2*s.* 6*d.* a load.

But a strong confirmation of the preceding valuation, is the consumption of clover by a tenant of Mr. *Ramey's*, who fed the very same stock (in number) in the field. Mr. *Ramey* watched it minutely, and when he had eaten 5 acres, this man's stock had consumed 30 acres, and his horses were not in such good condition. Thus does one acre of clover *mown*, go exactly as far as 6 *fed*\*.

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\* In Mr. *Ramey's* house on *Yarmouth Quay*, he has furnished a parlour with drawings of Mrs. *Ramey's* execution with a hot poker: there are several pieces of ruins after *Panini*, *Gisolfi*, &c. a *Dutch* skating piece, and some landscapes.  
The

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The neatness and minute accuracy with which they are done are wonderful. There is frequently a spirit in the strokes superior to the original prints. - After you have viewed *Yarmouth Quay*, which is one of the finest in *England*, you will find nothing in the place so much worth seeing as these very elegant performances.

## L E T T E R XIV.

**A**S I shall presently leave *Norfolk*, it will not be improper to give a slight review of the husbandry which has rendered the name of this county so famous in the farming world. Pointing out the practices which have succeeded so nobly here, may perhaps be of some use to other countries possessed of the same advantages, but unknowing in the art to use them.

From 40 to 60 years ago, all the northern and western, and a part of the eastern tracts of the county, were sheep-walks, let so low as from 6*d.* to 1*s.* 6*d.* and 2*s.* an acre. Much of it was in this condition only 30 years ago. The great improvements have been made by means of the following circumstances.

FIRST. By inclosing without assistance of parliament.

SECOND. By a spirited use of marle and clay.

THIRD. By the introduction of an excellent course of crops.



FOURTH. By the culture of turnips well hand-hoed.

FIFTH. By the culture of clover and ray-grafs.

SIXTH. By landlords granting long leases.

SEVENTH. By the country being divided chiefly into large farms.

In this recapitulation, I have inserted no article that is included in another. Take any one from the seven, and the improvement of *Norfolk* would never have existed. The importance of them all will appear sufficiently evident from a short examination.

### THE INCLOSURE.

Provided open lands are inclosed, it is not of very great consequence by what means it was effected; but the fact is, that parliamentary inclosures are scarcely ever so complete and general as in *Norfolk*; and how should they, when numbers are to agree to the same measure? Had the inclosure of this county been by acts of parliament, much *might have been* done, but on no comparison with what *is* done. The great difficulty and attention *then* would

L 4

have

have been to inclose: *Now* the works of improvement enjoy the immediate attention. And undoubtedly many of the finest loams on the richest marles would at this day have been sheep-walks, had there been any right of commonage on them. A parliamentary inclosure is also (through the knavery of commissioners and attorneys) so very expensive, compared with a private one, that it would have damped the succeeding undertakings; in taking too large a portion of the money requisite for the great work, in a mere preparation for it.

These circumstances are to be seen more or less in most of the countries inclosed by parliament.

### MARLING.

It is the great felicity of the sandy part of this county, that dig where you will, you find an exceeding fine marle, or clay. The marle is generally white, with veins of yellow, and red; sometimes only tinged with those colours. If dropped in fair water, it falls, and bubbles to the top; if it is very good, it has an effervescence. All effervesce strongly in vinegar, if dropt  
in

in it in a lump, and some will at once make the glass, though but half full, boil over in a froth. But most will do this if the marle is powdered before it is put in. The clay has none of these qualities. The best marle is that which falls the quickest in water, for such will always have the greatest effervescence in acids.

It is common in this county to hear of the *salts* of marle. As well as they understand the use of it, they know little of its nature; no salts are to be extracted from marle: though a little oil is to be gained. It may produce salt when spread on the land, by its absorbent and alkaline quality, attracting the vitriolic acid, and converting it into a neutral salt; and this quality is probably one of its greatest advantages. It likewise not only attracts oil from the air, but dissolves, and fits it for the purposes of vegetation.

I have not met with any persons that have been curious enough to form a series of small experiments on marle, for the discovery of the proper *quantities* for use, in proportion to the given *qualities* of it.

The farmers, on the first use of marle,

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spread it in larger quantities than others have done since: 100 loads were common, and few used less than 80. But land is now marled for the first time in some places with not more than from 40 to 60 loads. The reason given me for this change was principally a view to future marlings: if 80 or 100 are laid on at first, they do not think a repetition of 20 or 30, at the end of 20 or 25 years, will answer so well as if the first quantity had been smaller.

It is yet an opinion among some farmers that their land will not pay for a second marling. But the best husbandmen in the county are clearly of a different way of thinking. When the first manuring is wearing out pretty fast, which generally happens in about 20 years, they (on the renewal of their lease) replenish the ground with an addition of from 20 to 35 loads an acre more. And several tracts of country have been marled with success for the third time.

But it is not the marle or clay alone that has worked the great effects we have seen in *Norfolk*. It must be spread on a suitable soil: this is a light *sandy loam*, or *loamy sand*;

*sand*; not a sand. In some places a *gravelly loam*; but not a gravel. What they call their *woodcock* loams are free from gravel, and rather so from sand; they are more inclinable to a dry friable clay, but at the same time found and dry enough for turnips.

These are their best soils.

Some tracts of pure sand have been marled, and with success, though not so great: but clay, from its superior tenacity, is reckoned better for them than marle.

The reader is not to suppose that the *Norfolk* men have depended on these manures alone; on the contrary, they have been very attentive to others. Folding sheep, through both winter and summer, is no where more practised, or better understood. Winter fattening beasts on turnips in the farm-yards; confining the cows to those yards; and keeping in them very large stocks of swine, convert their plenty of straw into manure; which they make good use of. Oil cake they lay on their wheat, at an expence of 40s. or two guineas an acre. All these manures they use to far greater profit than if their land had  
not

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not been marled.—That foundation of their husbandry is a preparative for all successive manurings; they take the greater effect from following an absorbent earth, and last (it is asserted) the longer: but that I should doubt.

### THE COURSE OF CROPS.

After the best managed inclosure, and the most spirited conduct in marling, still the whole success of the undertaking depends on this point: No fortune will be made in *Norfolk* by farming, unless a judicious course of crops be pursued. That which has been chiefly adopted by the *Norfolk* farmers is,

1. Turnips
2. Barley
3. Clover; or clover and ray-grass
4. Wheat.

Some of them, depending on their soils being richer than their neighbours (for instance, all the way from *Holt* by *Aylsham* down through the *Flegg* hundreds) will steal a crop of pease or barley after the wheat; but it is bad husbandry, and has not been followed by those men who have made fortunes. In the above course, the  
turnips

turnips are (if possible) manured for; and much of the wheat the same. This is a noble system, which keeps the soil rich; only one exhausting crop is taken to a cleansing and ameliorating one. The land cannot possibly in such management be either poor or foul.

The only variations are in the duration of the clover; which extends from one year to three or four. On the first improvement, ray-grass was generally sown with it, and it was left on the ground 3 or four years: but latterly they sow no more ray-grass than merely sufficient for their flocks, and leave it 2 years on the ground. The rest of their clover crop is sown alone, and left but one year. Opinions are not clear on these variations. Some think the modern method an improvement; others, that the old one was better.

If I may be allowed to hazard an idea on this point, I should venture to condemn the ploughing up the clover the first year; and for these reasons. It is exhausting the land more: Two crops of corn in four years, exhaust much more than two in five years: hence appears to me the *modern* necessity

cessity of buying oil cake at two guineas an acre. The marle is lost sooner in this method, for that subsides in exact proportion to the quantity of tillage in a given time. It does not sink while the land is at rest; but while it is pulverizing by the plough. Lastly, the stock of cattle is less, consequently the quantity of dung inferior; instead of folding 25 acres, only 20 are done. They do not pretend that the wheat after a lay of *two* years is worse than after that of *one*—but they say it is not so clean. I admit that there will be more trouble in clearing the turnip fallow of twitch; but let that trouble be carried to account, and it will not balance the counter advantages.

Besides, the best farmers agree, that if the turnip fallow is well executed; the plants twice well hoed, and the land stirred thrice for barley; that, then the clover lying 2 years, will not give a foul crop of wheat. Twitch generally comes from some neglect.

### TURNIPS.

Every link of the chain of *Norfolk* husbandry has so intimate a connection and depend-



dependance, that the destruction of a single one, ruins the whole. Every thing depends not only on turnips, but on turnips well hoed; an assertion that will receive but little credit in various parts of the kingdom. Turnips on well manured land, thoroughly hoed, are the only fallow in the *Norfolk* course; it is therefore absolutely necessary to make it as complete as possible. They cannot be changed for a mere fallow, because the stock of sheep kept for folding, and eating of the clover and ray-grass; and farm-yard cattle would then all starve; and add to this, that the tillage during the latter part of the summer, &c. which must be substituted instead of them, would pulverize the sands too much, which are greatly improved by the treading of the cattle that eat the crop off. In a word, the improved culture of this plant is so important to the *Norfolk* husbandry, that no other vegetable could be substituted that a common farmer would cultivate.

### CLOVER AND RAY-GRASS.

This also is another article that could not possibly be dispensed with. The light  
parts

parts of the county have neither meadows nor pastures; their flocks of sheep, dairies of cows, their fattening beasts in the spring, and their horses all depend on these grasses, and could subsist by nothing else; nor could they raise any wheat without this assistance. Their soil is too light for that grain before it is well bound and matted together by the roots of the clover, which are at the same time a rich manure for the wheat: a fallow instead of clover would be worse than nothing, it would render the land much too light. For these reasons, which certainly are decisive, nothing could be done here without clover.

### LEASES.

It is a custom growing pretty common in several parts of the kingdom, to grant no leases: this will do very well where no improvements are carried on; where a tenant can never lose any thing by being turned out of his farm: but it is absurdity itself to expect that a man will begin his husbandry on your land by expending 3, 4, or 5*l.* an acre, while he is liable to be turned out at a year's notice. I shall not  
take

take up more of your time on a point which is self-evident. Had the *Norfolk* landlords conducted themselves on such narrow principles, their estates, which are raised five, six, and tenfold, would yet have been sheep-walks.

### LARGE FARMS.

If the preceding articles are properly reviewed, it will at once be apparent that no small farmers could effect such great things as have been done in *Norfolk*. Inclosing, marling, and keeping a flock of sheep large enough for folding, belong absolutely and exclusively to great farmers. None of them could be effected by small ones—or such as are called middling ones in other countries.—Nor should it be forgotten, that the best husbandry in *Norfolk* is that of the largest farmers. You must go to a *Curtis*, a *Mallet*, a *Barton*, a *Glover*, a *Carr*, to see *Norfolk* husbandry. You will not among them find the stolen crops that are too often met with among the little occupiers of an hundred a year, in the eastern part of the county. Great farms have been the soul of the *Norfolk* culture: split them into tenures

of an hundred pounds a year, you will find nothing but beggars and weeds in the whole county. The rich man keeps his land rich and clean.

These are the principles of *Norfolk* husbandry, which have advanced the agriculture of the greatest part of that county to a much greater height than is any where to be met with over an equal extent of country. I shall in the next place venture slightly to mention a few particulars in which the *Norfolk* farmers are deficient.

1. Pease are never hand-hoed.
2. Wheat, though weedy, the same.
3. Beans, the same every where, except in marshland.
4. No regular chopping of stubbles for littering the farm-yards: it is very incompletely practised.
5. Meadows and natural pastures managed in as slovenly a manner as in any part of the kingdom.
6. The breed of sheep contemptible.
7. That of horses very indifferent.
8. Vast tracts of land admirably fit for  
carrots;

carrots; but none cultivated except a very few near *Norwich*.

. All their hedges managed on the old sad system of cutting off live wood, and supplying the place with dead: no plashing.

These circumstances, however, are by no means a balance to the merit of the good husbandry before stated; I hint them only as matters deserving the attention of farmers, who have shewn in general such enlightened views.

I am, Sir, &c.

M 2

## L E T T E R XV.

**F**ROM *Yarmouth* to *Beccles* the country is various, but in general cultivated pretty well; rents rise from 9*s.* to 16*s.*—The latter mentioned town is clean, well built, paved, and prettily situated by a river. Four miles south of it, land lets on an average at 12*s.* an acre. I observed several fields that seemed new laid to grass, and extremely well done; and having several times heard of *Suffolk* being famous for grass feeds, I made enquiries concerning them. They lay down with 3*lb.* of trefoile *per* acre, 1  $\frac{1}{2}$ *lb.* of white clover, and 5 sacks of hay feeds, which they gain by shaking the hay off clean upland meadows of a rich soil, with forks in winter before they use it. And then they dress them with great care. They assured me, that they get the feeds quite clean and free from weeds. An acre of hay yields 3 or 4 sacks of 3 bushels; and they sell in proportion to the goodness,

from

from 2s. 6d. to 4s. a sack. Very fine feeds they reckon to grow about *Laxfield*, *Baddingham*, *Fressingfield*, *Ottley*, and *Helmingham*. When they lay down, they always sow with spring corn: mow it the first year, and get a load and half of hay an acre.

Their products of corn are as follow:

Wheat, 2 quarters.

Barley, 2  $\frac{1}{2}$  quarters.

Oats, 4 quarters.

Beans, 4 quarters.

Turnips, worth 30s.

Clover, 2 loads of hay, at 2 mowings.

But they insist that the land is tired of clover; it comes up thick and fine, but is all eaten off in *February* by a red worm, which did not use to happen to them.

They use only wheel ploughs, and but 2 horses.

In several parts of this country, particularly towards *Hoxton*, and *Rumburgh*, there are very great dairies kept; up to 40, 60, and 70 cows, which they use all for butter and cheese; their cows give from 2 to 8 gallons of milk a day; the breed, all the little *Suffolk* mongrel. One of them

will eat 2 acres of grafs in fummer, and if ſhe has nothing elſe, a ton and half of hay in winter. They calculate the product from 4*l.* to 5*l.* each; but many dairies are let at 3*l.* 5*s.* a head. They reckon that each cow maintains a hog. The attendance upon them is in proportion to 3 dairy-maids and one boy to 40 cows.

On a farm of 250*l.* a year, they often keep 60 cows. And they reckon 3000*l.* neceſſary to ſtock a dairy one of 300*l.* a year.

Farms in general, riſe from 100*l.* to 300*l.* a year.

From *Beccles* to *Yoxford*, I obſerved little patches of hemp in the gardens of moſt of the cottagers, which is an inſtance of induſtry much to their honour.

At *Yoxford* I obſerved, for the firſt time, ſwing ploughs chiefly uſed. The farmers here think quite contrary to thoſe throughout *Norfolk*.

Towards *Saxmundham*, and about that place, the ſoil is all ſandy. Two miles on the other ſide of it, towards *Woodbridge*, I remarked exceeding good crops. Rents riſe from 6*s.* to 17*s.* but on an average are



14s. Farms, from 100*l.* to 500*l.* a year.

Their crops; Wheat, 2  $\frac{1}{2}$  or 3 quarters; Barley, 4; Oats, 4; Pease 3 quarters, all hand-hoed; Beans, 4 or 5 quarters, all hand-hoed twice, and many in drills. Let me here remark, that I have no where else found very light sands so rich as to be commonly cropped with beans, as these are; an instance of richness that is great. It proves that the opinion of beans requiring a great tenacity in the soil is quite false; for I ran a cane 2 feet deep in many fields here with ease.

They cultivate some carrots, but not so many as nearer to *Woodbridge*; but they are greatly to blame, for when they do sow that root, they get 5 bushels *per* square rod, which are 800 *per* acre; and at 1*s.* come to 40*l.* They give them to their horses instead of oats, and also fatten hogs on them.

For some miles further the land continued the same, a rich sand; the course,

- |            |                     |
|------------|---------------------|
| 1. Turnips | 3. Clover, one year |
| 2. Barley  | 4. Wheat.           |

Their turnips are worth about 30*s.* on an average, and the clover yields from 1

to 2 loads of hay at a cutting. But they have some tracts of poor sands which are not good enough for the above course; they will not yield turnips without dung; so are fallowed for oats, with the oats, clover, and ray-grass for 3 years, as a sheep-walk, then break it up for oats again; and after them fallow as before: where turnips *cannot be had*, this it must be confessed is not a bad course.

But the famous husbandry of this country is near *Woodbridge*; particularly in the space of country comprehended in the parishes of *Eyke, Wantesden, Bromeswell, Sutton, Shottisham, Ramsholt, Alderton, and Bawdfey*: through which country I have passed with pleasure; the sands about *Capel St. Andrews* are poorer—they form one farm of near 4000 acres. The former places lie pretty much together, forming a retired corner of the world, scarcely ever visited by travellers, and yet abounding in several instances with the best husbandry in *Britain*. In many particulars, it will surprize a stranger more than any thing to be seen in *Norfolk*.

Farms are of various sizes, from 100 *l.*

to 500*l.* a year; and the rents of two sorts: the poor sheep-walk lands, run at 4*s.* or 5*s.* an acre; but the better kind from 14*s.* to 20*s.*; in general about 16*s.*

Their courses on the good lands, are,

- |            |           |
|------------|-----------|
| 1. Carrots | 4. Beans  |
| 2. Turnips | 5. Wheat. |
| 3. Barley  |           |

This is an excellent one.

- |            |            |
|------------|------------|
| 1. Turnips | 4. Wheat   |
| 2. Barley  | 5. Beans   |
| 3. Clover  | 6. Barley. |

Another admirable course.

At other times, they drop the 5th and 6th crops; stopping at the fourth. Pease are sometimes used instead of the beans; and at others added after the barley as a 7th crop. It is an universal rule with them never to let wheat, barley, or oats, come twice together, and they adhere to it very strictly.

They plough the clover land but once for wheat; but the bean stubbles twice or thrice, if wanting. If the crop happens to be weedy, they hand-hoe it. The average crop 4 quarters *per* acre.

They plough three times for barley, and reckon

reckon the mean crop at  $5 \frac{1}{2}$  quarters; it rises very often to 6 or 7. When they sow oats, they never get less than 5 quarters.

Of pease, their culture is extremely perfect; they plough from once to 3 times for them; generally drill them, and never omit keeping them clean by hand-hoeing; from one to 3 hoeings, as the weeds happen to arise: the average crop about  $3 \frac{1}{2}$  quarters. Beans they are equally attentive to; they generally dibble them in rows equally distant, 16 or 18 inches asunder. The setting costs 3*s.* 6*d.* an acre: they never fail hand-hoeing twice, at the expence of 8*s.* an acre. They use the horse-bean, and also many *Windfor* ticks: Of the former sort their crops rise from 5 quarters to  $7 \frac{1}{2}$  quarters; and this upon sand!—Such are the effects of good culture! They get 4 or 5 quarters of the *Windfor* bean; and sell them from 40*s.* to 3*l.* a quarter.—This husbandry of pease and beans is nowhere exceeded.

They always hand-hoc their turnips twice, and feed them on the land with sheep and cattle.

Carrots are a crop that do them honour.

They sow them to choofe on their rich deep fand; I examined it particularly, and brought away about half a peck of it.—It is almoft a running fand, of a dark red colour, but has a principle of adhefion in it fufficient to produce any thing; it cakes together without the leaft baking or plaiftering, fo that a flight touch crumbles it. They plough the stubble but once for carrots, holding that better than giving any previous tillage.

About old *Lady Day* they trench plough with two ploughs in the fame furrow, the firft with three horfes, and the laft with two; getting a foot depth: they then immediately harrow in the feed, without any manuring. I enquired particularly into the failures of the crop; they faid that if the feed was good, carrots never failed: when once they came up they were fure. They never omit hand-hoeing them thrice, at the expence (the three times) of from 16s. to a guinea an acre. The hoe they ufe at firft is not above 4 inches wide; but they leave them at laft a foot afunder.

They begin to take up about *Michaelmas*, with three pronged forks; and except  
having

having a small store before hand, in case of hard frosts, always take up as they are wanted. The carrot tops wither, and rot upon the land; but no frosts affect the roots. Leaving them in the ground renders it necessary to sow turnips after.

As to the produce, I had in different places three accounts: First, that they yielded from 3 to 6 bushels on a square rod; the average is  $4\frac{1}{2}$ ; or 720 bushels on an acre. Secondly, that a crop generally gave 12 loads an acre, each 40 bushels, besides what is used at home; this was indefinite: the 12 loads come to 480 bushels:—one man thought the crop was 15 loads, or 600 bushels. Thirdly, I was informed that they came on an average to 1 *lb.* each, and stood over a whole field on a medium at 1 foot square; this quantity, at 56 *lb.* the bushel, is 776 bushels. The fairest way will be to take the average of the three accounts.

			<i>Bushels.</i>
By the rod,	-	-	720
By the load,	-	-	600
By weight,	-	-	776

Average 698 bushels.

They

They sell at 6*d.* a bushel: the crop therefore pays 17*l.* 9*s.* an acre. But I have already remarked that they are worth 1*s.* for fattening cattle.

They give large quantities to their horses; after washing clean, they are cut into the chaff. They allow a bushel *per* horse *per* day, and give no corn at all—yet their horses are constantly worked; but on carrots they will do as much work as on any food.

They likewise feed their hogs on them; and fatten many completely. No food does better for swine in general.

In their tillage they plough with but two horses, and break up their stubbles at *Michaelmas*; at first ploughing they do only an acre a day, but afterwards 1  $\frac{1}{2}$  or 2. They never keep their horses in the stable of nights, but turn them loose into the farm-yards. The breed of horses peculiar to this country is one of the greatest curiosities in it: I never yet saw any that are comparable to them in shape, or the amazing power they have in drawing. They are called the *forrel* breed; the colour a *bay forrel*. The form, that of a true round barrel,

barrel, remarkably short, and the legs the same; and lower over the forehead than in any part of the back; which they reckon here a point of consequence. They sell at surprizing rates; the good geldings or mares, at from 35 to 60 guineas each; and smaller ones, of 8, 9, or 10 years old, at 20*l*. But none of them are very large. The work they will do is extraordinary, being beyond comparison stronger and hardier than any of the great black breeds of *Flanders*, *Northamptonshire*, or *Yorkshire*. They are all taught with very great care to draw in concert; and many farmers are so attentive to this point, that they have teams, every horse of which will fall on his knees at the word of command twenty times running, in the full drawing attitude, and all at the same moment, but without exerting any strength, till a variation in the word orders them to give all their strength—and then they will carry out amazing weights.

It is common to draw team against team for high wagers.

I was assured by many people here, that four good horses in a narrow wheeled-wagon



gon would, without any hurt or mischief from over working, carry 30 sacks of wheat, each 4 bushels, (near 9 gallon measure) 30 miles, if proper fair time was given them. A waggon weighs about 25 *C. wt.* this weight therefore is very near 5 tons. And let me add, that they have not a turnpike near them. One might venture to assert, that there are not 4 great black horses in *England* that would do this.

Another most uncommon circumstance in the husbandry of this country, is the use of a manure peculiar to them, which they call *crag*. It is found in almost all the hills and higher lands in the country, at various depths, sometimes only 2 or 3 feet from the surface; and it lies in a deeper stratum than they find necessary to dig. It appears to be totally composed of shells crumbled into powder, many are found in it of their entire form, particularly muscles. The colour of it, a mixture of white and red. I brought away half a bushel; and have since tried it in strong vinegar, but it has not the least effervescence—nor any ebullition. And yet it undoubtedly enriches the soil far more than any marle;  
for

for the farmers here lay on but 10 or 12 cart-loads an acre, and the effect is amazingly great, with this uncommon circumstance, the soil is ever after greatly the better for it; nor do they, in 12 or 15 years, as is common with such small quantities of marle, find the benefit declining fast. But there is a strong notion among them, that the land can be cragged but once; if it is afterwards repeated, no advantage is found from it. This part of my intelligence I doubt very much; and especially as they find it very advantageous to form composts of crag and dung; which they practise much: carting the dung to the crag pits, and there making the compost heaps, turning it over twice, and sometimes thrice.

The redder the crag is, the better they reckon it.

The effect of it is so great, that in breaking up the poor heaths of this country, they have had a succession of exceeding fine crops of all sorts from such parts as they have manured with it; while at the same time, other parts unmanured have scarcely yielded

yielded the seed again.—All the rich inclosures of this country have been cragged.

The farmers here are very attentive to all sorts of manures. They raise large quantities of farm-yard dung, and cart it all on to heaps, and mix it either with crag or virgin mold; and this universally. They turn over and mix these heaps well together before they spread them on their land. They chop their stubbles; stack their hay at home, and fold their sheep constantly.

Upon the whole, this corner of *Suffolk* is to be recommended for practising much better husbandry, all things considered, than any other tract of country with which I am acquainted.

Their crag husbandry, their culture of carrots, their breed of horses, are circumstances peculiar, no where else to be seen: Their management of the pea and bean crops, is much more masterly than any thing met with in most parts of the kingdom. Their courses of crops are unexceptionable:—in a word, they exert every effort of good husbandry to command success.—They enjoy it: and well deserve

the fruit of their labours.—That of *Norfolk* is justly famous; but every thing considered, it must undoubtedly yield to the more garden-like culture of this country:—their crops are far superior to any thing in the neighbouring county.

*Flanders* has long been mentioned as the most perfectly cultivated country in *Europe*. What the soil is I know not; but I will venture to assert that,—soil equal, no *Flanders* husbandry can exceed the above described.

From *Woodbridge* to *Ipswich* the country is various; but much of it not cultivated so well as what I had passed. It lets from 10s. to 16s. *per* acre. I went from the latter named place to *Nacton*, purposely to view the house of Industry there. It is a large irregular building; the disposition of the apartments does not seem very well contrived for convenience. The original sum raised for the building and furnishing it was 4800*l.*; the average of the last seven years rates over the hundred was taken, and produced 1475*l.* a year. They have generally from 120 to 200 poor in the house; at present 144. They earn upon an average 250*l.* a year, which makes  
the

the income of the house 1725*l.* a year. This has been considerable enough to enable the trustees to pay off 1200*l.* of the debt; and it has been erected but 12 years.

It stands in an high airy situation: a healthy spot, and the whole appears to be kept in a very clean and wholesome manner. There are various apartments for men with their wives—for single men and lads—and also for single women and girls. For the sick, &c. and a surgery. There are likewise proper rooms for the different manufactures carried on; such as spinning, weaving, making twine, making sacks, &c. &c. also offices for baking, brewing, &c. with proper store rooms; and an apartment for the governor of the house, and for the trustees to meet in: the whole open to the view of any person that comes to see them; and also all the provision with which the poor are fed. They are undoubtedly taken excellent care of, both sick and well. The following is a table of their diet.

#### SUNDAY.

Breakfast. Bread, and cheese, and butter, and milk.

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Dinner. Beef and dumplings. Pudding  
and mutton for the sick.

Supper. Bread, and cheefe, and butter,  
and milk are the supper every day in  
the week.

### MONDAY.

Breakfast. Beef broth.

Dinner. Baked suet pudding.

### TUESDAY.

Breakfast. Milk broth in winter ; milk in  
summer.

Dinner. Beef and dumplings.

### WEDNESDAY.

Breakfast. Beef broth.

Dinner. Rice-milk or broth, &c.

### THURSDAY.

Breakfast. Milk in summer ; milk broth  
in winter.

Dinner. Beef and dumplings.

### FRIDAY and SATURDAY.

Breakfast. Meat broth.

Dinner. Bread and butter.

Pease porridge used to be the dinner on  
the two last days, but they petitioned for  
bread and butter instead of it, which

found

found their favourite dinner, because they have tea to it. I expressed surprize at this being allowed; but they said they were permitted to spend 2 *d.* in the shilling of what they earned, as they please; and they laid it all out in tea and sugar to drink with their bread and butter dinners.

Indulgence renders it necessary to let them do as they please with it, but it would be better expended in something else.

Whatever they eat is perfectly good of the kind; the best wheat; none but good *Warwickshire* cheese; the best beef; and every article the same: no neighbouring poor live near so well in their own cottages; and not one little farmer in ten. They are clothed in a warm comfortable manner, and are in general pretty well satisfied with their situation; but the confinement disgusts them; they are not allowed constant liberty without the yards (which indeed would be impossible) and this they dislike.—A surgeon attends twice a week regularly; and oftener if necessary.

The grand points in the establishment are, the poor being better taken care of

than in the old parochial method; and at the same time a saving of 100*l.* a year made. These two points are those principally to be attended to, in any discussion of the merit of these establishments; because it is impossible they should unite without exceedingly beneficial consequences flowing from them. That the poor of all sorts are taken the utmost care of, is a fact indisputable, clear to the eyes of every stranger, as well as thoroughly known to every person in this neighbourhood.

There remains a debt of 3600*l.* which will all be paid off sooner than may at first be imagined. If they paid off 100*l.* a year while they had the interest of 4800*l.* to discharge; now they have only the interest of 3600*l.* to pay, they consequently liquidate 148*l.* a year, which in the next ten years will reduce the debt to 2120*l.* The ten years following, they will in the same proportion discharge 208*l.* a year, which will clear the remaining debt in eleven years. So that the sum total will be paid off in 33 years from building the house.

Then (and not till then) they lower rates.

The



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The total income is 1725*l.* a year, which enabled them, after maintaining their poor, to pay 192*l.* a year in interest, and 100*l.* in discharge of debt, in all 292*l.* a year. They receive from the parishes in rates 1475*l.* a year; consequently they can then immediately sink this sum 292*l.* which reduces it to 1183*l.*—which reduction amounts to *a fifth*.—And this seems the ultimate degree of benefit, in respect of lowering rates; and a matter of importance it is, when we consider that it is gained by the same measure, which adds so much to the advantage of the poor.

But there are four or five other houses of Industry in this county, and one in *Norfolk*; some of which I find have made vastly greater savings, even to the discharging more than half their debt in 10 or 12 years; such houses will in the end, and speedily too, sink the rates much more considerably.

*Bosmere* and *Claydon* hundreds have one of only 5 years standing. They borrowed 10,000*l.*; the rates amount to 2526*l.* annually, and the earnings 400*l.* a year. Total income 2926*l.* In these five years

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they have paid off 1400 l. which has reduced the debt to - - - £.8600

In 5 years more they will  
 pay off the same, £.1400  
 Also the deduction of interest, 280  
 ----- 1680  
 -----

The debt will therefore in 10 years, from the first establishment, be reduced to - - - 6920

In 5 years more the same payment will be made, 1400  
 Also deduction from interest, 620  
 ----- 2020  
 -----

The debt in 15 years, from first establishment, will be reduced to, 4900

In 5 years more, - 1400  
 Deduction from interest, 1020  
 ----- 2420  
 -----

In 20 years, reduced to - - 2480

In 5 years more - 1400  
 Also the deduction of interest, 1500  
 ----- 2900  
 -----

In 25 years the whole debt paid. And as they paid at first 400 l. a year in interest, and 280 l. in discharge of debt, together

680*l.* a year; the proportion of that sum to 2926*l.* is the proportion in which the rates will be lowered. It is near a fourth.

It may be asked, how can these establishments be so beneficial to the poor, while they lessen the expences so much? I reply; In two ways. First, in going cheaper to work with every thing than parish officers can, who have not the same advantages. Weekly allowances in the parish, must be given in proportion to the abilities of the poor to gain what they want. Diet of all sorts, firing, cloaths, &c. are all procured by them at the dearest rate. If they buy cheese, it is by the pound; candles, single; soap half a pound; and as they have them from the most paltry of all shops, they consequently pay extravagant rates for the worst commodities. This runs through their whole expenditure——they must necessarily be paid by the parish, sufficiently to enable them to support all these disadvantages.

This is very different at the Hundred House; advertisements are regularly inserted in the *Ipswich* journal when any commodity is wanted, that the trustees will

meet

meet at such a day to receive proposals, and view samples of such and such commodities. Every thing is bought in the great, and paid for at once——no private family lives so cheap. In the article of firing, what a vast difference between buying by the faggot, for various miserable fires, and a union of them into ship loads of coals? House-rent in the parishes was also a heavy article; but in what proportion to the rent of the Hundred House, cannot be ascertained.

The difference in the expence of surgery and medicine must be immense.

The second means of saving is this. The Hundred House pays no weekly allowances in the parishes; whoever wants assistance, must go to the house, unless they are really unable. This at once strikes off a very great expence; for in all parishes that have no workhouses, numbers of the poor thro' clamour, or the weakness of justices of the peace, obtain allowances that would not stir from their cottages for twice the sum: all such are cut off. Besides the numbers that betake themselves to a more industrious life, in order to keep at home in their parishes:

parishes, all having a much stronger inclination for that than to go away.

These, I think, are two very powerful reasons for the expence being lowered; and in addition to them, the superior earnings ought certainly to be mentioned.—

But in respect to the general good.—

It is evident that these houses tend strongly to reduce poor rates, and partly by creating a new industry. Are not these objects of infinite importance! are they not the remedy of those evils, whose enormity has been the subject of complaint for so many years throughout the kingdom? Is it not therefore greatly incumbent on parliament, to render universal, establishments that have been long experienced to work such good effects? It is much to be wished that they were made general.

I made the requisite enquiries into the objections against them; and I found but few of any consequence.

*First*, The farmers complain that where poor rates are lowered by them, the landlords take advantage of it, and raise their rents in proportion.—

I reply:—So much the better; who of

Common sense ever supposed it a contrivance to put money in the pockets of farmers? If rates are lowered, it ought to be the gentleman's advantage; for his estate always lets in exact proportion to the height of rates; and if he can let land that is worth 20s. an acre for only 16s. on account of heavy rates, surely he ought to have the benefit of raising, when he has so long laboured under the evil of sinking?

But the farmers are piqued in many hundreds, and will never agree to the measure.

*Secondly*, It depopulates a hundred; for the poor not liking the house, the servants let themselves in other hundreds.

This objection exists merely while the establishment is local; make it universal, and it ceases at once.—The reality of the matter was, however, expressly contradicted to me, by persons on whom I can well depend. They assured me, that they felt no such evil.

*Thirdly*, The acts of parliament which establish the Houses, being extremely various, and yet *public* acts, they may be  
very

very troublesome to lawyers in any future pleadings on them.

One act *might* comprehend the whole kingdom. There is no *necessity* for every hundred to have a distinct act. But suppose the case; let these gentlemen take so much the greater pains.—Those who are so ready with abridgements in 500 folio's; may just as well turn over 5000.

*Fourthly*, Gentlemen will not attend the trust—it then becomes a job in the hands of farmers and tradesmen.

This objection holds equally against all public works executed by commissioners; such as turnpikes, drainages, navigations, harbours, &c. &c.—It is too difficult a thing to *force* people to do their duty; and yet we find the works performed. Many are careful enough to attend; some won't, and then evils may arise which force them to it: but in some way or other the business is done, without any flagrant or striking impositions. Thus it would be with Houses of Industry: Some have been erected these dozen years, and yet I could not find that any mischiefs had arisen from a want of attendance:—making such a progress

progress in paying off the debt, does not carry that appearance.

Upon the whole, the objections that have been made to these establishments are by no means solid: but supposing they were; are we to enjoy none of the benefits of improvement, because objections are started? What good is gained without its attendant evil? Make a navigation, you waste land to convert it into water; and you cut through people's properties. Make a turnpike—you tax the whole country. If you will execute no improvement but what may be performed without the least objection—you for ever tie your hands from doing good. Compare the advantages with the inconveniences:—View the scale—and then determine. It should be the business of cavillers alone to start objections, that will not, united, overturn the benefit proposed: For a nation to conduct itself by such ideas, is to revolve into the barbarism of the darkest ages.

The husbandry of the neighbourhood of *Ipswich* is in general very good. About *Bramford*, farms rise from 50*l.* to 250*l.* a year;



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ear; the average from 80*l.* to 120*l.* The soil in some places is all strong clay; in others good loams: much gravelly loam, equally good for both turnips and wheat gets from 10*s.* to 15*s.* an acre; average 2*s.* 6*d.* The rent from hence to *Hud-  
digh*, about 13*s.* The course of crops,

- |                    |                    |
|--------------------|--------------------|
| 1. Turnips         | 4. Wheat           |
| 2. Barley          | 5. Pease or beans. |
| 3. Clover one year |                    |

*And,*

- |            |          |
|------------|----------|
| 1. Turnips | 4. Wheat |
| 2. Barley  | 5. Oats. |
| 3. Clover  |          |

This addition of oats is bad.

Upon the clay soils it is,

- |           |            |
|-----------|------------|
| 1. Fallow | 4. Wheat   |
| 2. Barley | 5. Beans   |
| 3. Clover | 6. Barley. |

Admirable! No course can exceed this.

They plough but once for wheat, sow 2 bushels, and get 26 bushels on an average. For barley they stir three or four times; sow 3 bushels *per* acre, and get 4 quarters on an average. They plough but once for oats; sow 4 bushels, and reckon the mean product at 4  $\frac{1}{2}$  quarters. They sometimes

sow

sow coleseed for seed, and never fail o getting fine wheat after it.

They give from 4 to 6 earths for turnips always hoe them twice; feed them on the land with sheep or fattening oxen. They mow some of their clover for hay; and some they feed the first growth, and mow the second for seed; they never fail o great crops of wheat after mown clover—but they dung the stubble.

In respect to manuring, they are excellent farmers: they form composts with all their farm-yard dung, mixing it well with what they call chalk, but which I found on trial to be excellent marle. They put about a third part of chalk. Some farmers have limed their land, and with good success. All chop their stubbles, and stack their hay at home. All the way from *Ipswich* o *Shotley*, and so to *Maningtree*, through the hundred of *Sampford*, they are admirable husbandmen, and have excellent land to work on: they use great quantities of sea ouze, and find it of great use; particularly in forming composts with their farm-yard dung, which, when well mixed together, they spread on their light lands.

They

They form these heaps from the sea, and their yards in spring, and mix them well together through the summer for spreading on the clover lays for wheat.

All wheat throughout this country that is weedy, is as regularly hand-hoed as their turnips; the price 6s. an acre. They also hand-hoe all their beans twice; and never fail of sowing wheat after them.

About *Wolton* and *Felixton* the soil is remarkable rich. Their common course is,

- |          |           |
|----------|-----------|
| 1. Beans | 2. Wheat: |
|----------|-----------|

and so on for ever.

*Nataniel Acton*, Esq; of *Bramford*, to whom I am obliged for the preceding particulars, has tried various experiments, that cannot fail of being particularly useful. Among other crops he has cultivated carrots with success.

*Experiment, No. 1.*

In 1768, two acres of good light turnip loam were trench ploughed, and carrot seed harrowed in in *March* without manuring. The plants arose very regularly, and were hand-hoed three times, at the expence of thirty shillings an acre; and taken up

at once as soon as the tops withered. They were laid up for winter use, and applied chiefly to the feeding horses, who all did excellently well on them. Mr. *Acton* found that such parts of the heap, as were not packed close together after being well dried, were apt to rot; but all that were dry and close laid, kept perfectly sound.

*Experiment, No. 2.*

In 1769, an acre of the same soil received the same culture; thrice hand-hoed, at the above expence; and being carefully dried before they were laid up, and packed close together, none were rotten. Taking up 17. an acre. Given to horses instead of oats; and they never did better.

*Experiment, No. 3.*

This year, 1770, he has one acre; a very fine regular crop, cultivated in the preceding manner, and will turn out very good.

Respecting the produce, Mr. *Acton* has found but little variation—he has had them accurately measured—and finds that the quantity is 6 bushels *per rod*, or 960 bushels *per acre*: these at 8*d.* a bushel, the *Bra-*  
*fed*

ford price, come to 32*l.* But I beg leave once more to observe, that I have found carrots to be worth 1*s.* a bushel in feeding cattle; at which price these crops have been worth 48*l.* an acre.—But whether the value is 24, 32, or 48*l.* is not of much consequence; for take the lowest price, and you will find no crop that *British* fields produce equally profitable.

*Experiment, No. 4.*

*April* 3d, 1770, some cabbage seed was sown on a bed of rich ground; both the great *Scotch* sort, and Mr. *Reynold's* turnip-rooted cabbage: *June* 23d, they were transplanted into the field; the soil a rich black loam; the first sort 3 feet by 2, the latter 2 feet by 18 inches. I viewed both crops with great pleasure; they were uncommonly fine: the *Scotch* plants 3 feet over, and *Reynolds* 2 feet; both of a deep green and remarkably luxuriant. I think the turnip cabbage bids fair for being the largest crop I have yet seen of them. Mr. *Acton* gives both sorts fair play, for he keeps them as clean as a garden.

*Experiment, No. 5.*

The *Egyptian* turnip has been tried by this gentleman in some small experiments to see if it would do for the spring food of cattle—the root proves of a trifling size, but the leaves remain in full luxuriance through the sharpest winter; no frosts affect them; and it sprouts fresh very early in the spring.

*Experiment, No. 6.*

In planting, Mr. *Acton* has tried the *Turin* poplar, and finds that it shoots 10 feet in a year, and perfectly straight. He has also measured the shoots of the *Norfolk* willow, 12 feet long. Larches thrive greatly here; they are worth 1*s.* 6*d.* each in 9 years; which is an astonishing profit, and beats the finest husbandry.

*Experiment, No. 7.*

This gentleman has in the present year a remarkable instance of the quick vegetation of lucerne, even the first year of sowing. In 1769, two acres of a fine light rich loam were cropped with turnips; the land was ploughed quite fine after feeding  
ther

them off, and in the spring drilled with lucerne; the seed failing, it was ploughed up, and again drilled in *July*, and in a month was 12 inches high; it has been hand-hoed thrice: I found it as clean as a garden. The rows are equally distant; 22 inches asunder, very straight, regular, and not straggling; which circumstances I mention, as it was drilled by hand in the furrow after the plough. It promises to be an excellent crop.

*Experiment, No. 8.*

In Mr. *Acton's* grass land, one of the most troublesome weeds he has met with, is the common nettle; and so difficult to extirpate, that it has foiled him in many attempts. He tried an experiment in one spot on grubbing them; the place was grubbed clean with a pick-ax, the roots taken out, and the surface levelled—the nettles came again in as full luxuriance as ever. He then tried mowing them as fast as they grew high enough for the scythe; and this method by perpetual bleeding succeeded; it is the only one on which he can depend. It is always of importance to

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know those methods, which have proved most successful in the destruction of every weed; in this respect, matters seemingly of no consequence, are oftentimes passed over by inattentive persons, until they find themselves in a situation that shews the impropriety of slighting such information. Mowing less than three times a year will not destroy them.

### *Experiment, No. 9.*

In 1769, nine acres were cropped with turnips and fed on the land. In 1770, it was sown with barley and grasses for a meadow; the seeds 12 *lb.* an acre of white *Dutch* clover, and 3 sacks of fine dressed hay-seeds. I viewed the field, and found the ground covered with a luxuriant growth,

### *Experiment, No. 10.*

Another field was cropped with turnips in 1768, fed off for barley in 1769, and seeds sown with it; 4 sacks *per* acre of fine hay-seeds, 4 *lb.* of trefoile, 4 *lb.* of white clover, and 4 *lb.* of red clover. After the barley was carried off, it was well manured from the compost dunghill. And this  
year,



year, 50 *C. wt.* of hay *per* acre was mown; and the after-grass coming on with great luxuriance.

Mr. *Aston's* common husbandry is excellent, and his crops good. His course of crops is,

1. Turnips, well hoed twice, and worth 35*s.* an acre.
2. Barley, 5 quarters *per* acre.
3. Clover, which yields 4  $\frac{1}{2}$  tons of hay at 2 mowings.
4. Wheat, on one ploughing, always hand-hoed at the expence of 6*s.* an acre; the produce 4 quarters *per* acre.

He manures his fields richly; uses a clayey marle, very rich, if we may judge from the strong effervescence with acids; he lays from 50 to 90 loads an acre; the strongest effect of it is cleaning the land from all weeds, which it does in an uncommon manner; nothing destroys poppies more. He makes composts of pot-ash, cow-dung, horse-dung, and turf, which he mixes well together, and finds it a great improvement. The pot-ash, 12*s.* for 70 bushels. He lays 15 loads an acre of this compost.

In the management of his farm-yard he is also very attentive to the raising dung; he confines all his cattle the winter through, and conducts all the urine that runs off, into a pit, where he absorbs it all in straw. This is a very good method. It is an unaccountable circumstance that nine tenths of farmers, gentlemen as well as others, give so little attention to this very important part of their business.

Mr. *Acton* has contrived his cow-shed extremely well; it has a hay-stack yard behind it, and the racks are open to it, so that the hay, without any trouble, is thrown directly from the stack into it. His cart horses are never confined to the stable, but have a yard to run about at pleasure with an open shed, under which they run, with a rack and manger for their oats and hay.

Covered drains this gentleman has made in his wet fields with very great success; he has found the value of the land doubled by their means: before they were made, it was in vain to spread any manure, the effect was so trifling; but since the drainage every spoonful takes effect.

From

From *Bramford* to *Hadleigh*, the soil is heavier than around *Ipswich*; they have not the same command of turnips. About *Hadleigh* is much sandy loam called woodcock land; lets on a medium at 15*s.* an acre. Poor rates are 3*s.* in the pound more, and tythe 4*s.* an acre. The country from hence to *Lavenham* runs at 12*s.* an acre; to *Stow-Market* 10*s.* 6*d.*; and to *Colchester* 14*s.*

Farms here, rise from 40*l.* to 300*l.* a year.

Their course of crops is,

- |            |                        |
|------------|------------------------|
| 1. Turnips | 3. Clover 1 or 2 years |
| 2. Barley  | 4. Wheat.              |

The products;

Of Wheat, 4 quarters *per* acre.

Of Barley and oats, 4 quarters 2 bushels.

Of Pease 2  $\frac{1}{2}$  quarters.

Of Beans the same.

Clover they mow once for hay, and get 2 ton an acre. Their turnips are worth from one guinea to three—average 1*l.* 11*s.* 6*d.*

They feed much clover with hogs, which they find a very profitable application of it. Turn them in in *May* of all sizes, and keep

keep them in it without their coming home, till the stubbles are ready for them. The dairy wash is all kept for young pigs. This management is common here.

Many of their turnips they apply to fattening beasts; *Scotch* cattle, and also the *Yorkshire* long and short horned. They give from 7*l.* to 9*l.* in *August*; turn them into stubbles, and then to turnips in the field. Some they buy at 3*l.* to 4*l.* 10*s.* and sell at 40*s.* advantage. Others buy larger cattle to eat off the after-grass, and then they are put to turnips; and from turnips in the spring to the summer's grass; and sell fat in *July*. But many go off fat from the turnips. This system of giving them first the after-grass, and felling fat from turnips, they justly reckon a very profitable one.

There are large tracts of rich meadow here, that let to 35*s.* an acre. They apply it to grazing and mowing; 2 acres will carry 3 cows through the summer: the crops of hay 2 tons an acre. A good cow will give 8 or 9*lb.* of butter a week.

Their principal sheep husbandry is to buy wether lambs in *August*, which they

turn into their stubbles; then they put them to turnips, making them follow the fattening beasts. In the spring they turn them into the clovers, and keep them there till fat, which will be in *July* or *August*: they always double their money, and sometimes do more.

In tillage they reckon 7 horses necessary for 100 acres of arable land; they use 3 in a plough, in light work but 2, and do an acre a day; the depth 5 to 7 inches: and generally plough up their stubbles before *Christmas*.—Wheel ploughs only used.

They reckon 500*l.* necessary for stocking a farm of 100*l.* a year.

The employment of the poor here, is the woollen manufacture. Many spinners and combers; the latter earn 8*s.* or 9*s.* a week; the spinners 4*d.* a day. All drink tea; many of them thrice a day.

#### LABOUR.

In harvest, 2 *s.* a day and beer.

In hay-time, 1 *s.* 6 *d.* and ditto.

In winter, 1 *s.* 2 *d.*

Reaping 4*s.* an acre

Mowing, making, and cocking grass for hay, 4*s.* an acre.

Hoing

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- Hoeing turnips, 4*s.* and 2*s.*  
 Thrashing wheat, 2*s.* 4*d.* a quarter.  
 ———— barley and oats, 1*s.* a quarter.  
 Head-man's wages, 10*l.* to 10*l.* 10*s.*  
 Next ditto, 7*l.*  
 Lad's, 3*l.*  
 A dairy-maid, 3*l.*  
 Other maids, 2*l.* 10*s.*  
 Women will not work in harvest, only glean.

### PROVISIONS.

Bread,	-	-	1 $\frac{1}{4}$ <i>d.</i> per <i>lb.</i>
Cheese,	-	-	4
Butter,	-	-	9 per 20 ounces.
Beef,	-	-	3 $\frac{1}{2}$
Mutton,	-	-	4
Vcal,	-	-	3 $\frac{1}{2}$
Pork,	-	-	4
Milk,	-	-	$\frac{1}{2}$ <i>d.</i> per pint.
Potatoes,	-	-	4 per peck.
Labourer's House-rent,			40 <i>s.</i>
——— firing,			30 <i>s.</i>

The particulars of a farm as follows.

300 Acres in all	16 Horses
250 Arable	6 Cows
50 Meadow	18 Young cattle
£.200 Rent	40 Swine

62 Acres Turnips	4 Men
62 Barley	1 Boy
62 Clover	2 Maids
62 Wheat	4 Labourers

All this country has been chalked; the quantity generally 10 waggon loads an acre. But now they mix it with farm-yard dung, and reckon this management of it the best husbandry.

Many of them chop their stubbles; and all stack their hay at home.

Some of my readers may perhaps remember a passage in my *Six Weeks Tour*, wherein I gave an account of a field of lucerne of doctor *Tanner's*. On coming again to *Hadleigh* I was very desirous of seeing it, and having further information concerning it, as it is now seven years old. The Doctor was so obliging as to shew it me: I found the field very regularly planted; the bare spots quite inconsiderable; the verdure fine, and very few weeds in it. The Doctor expects it to last 10 years longer. Respecting the produce, it is as great as ever: He has a very clear way of deciding the value of it, from the particular circumstance of always feeding three small

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small meadows before he had the lucerne, and always mowing them since: they yield just 14 loads of hay weighed dry in the winter; and the average price is 40s. a load: the four acres of lucerne, therefore, save him 28*l.* in hay, besides maintaining 80 sheep a month every autumn, which at 3*d.* a week, comes to 4*l.*; the whole produce is therefore 32*l.* the four acres, or 8*l.* *per* acre. This is greatly to the honour of broad-cast lucerne, and proves very clearly its immense importance.

If the first crop was mown for hay, the produce would be 30 *C. wt.* an acre; and the Doctor finds a load of it to be as good as a load and half of any other hay. I examined a parcel of the hay, and never saw any that equalled it either in scent or colour, and the leaves were all on.

It is the only food of his cows; and none give better milk, cream or butter; the butter is uncommonly excellent. Some of his horses are fed totally on it, without either oats or hay; I saw them, and they are quite fat, with marbled coats, though constantly worked.

It



It is manured once in four years, with about 12 loads an acre.

Upon the whole, Doctor *Tanner* is clear in the uncommon advantages of sowing lucerne broad-cast. The only culture it requires, is a thorough harrowing in *February* or *March*, and scattering a little seed in the patches where it fails: and the convenience of so small a portion of land maintaining such a great stock of cattle, is unequalled in any other crop.

The country is pretty rich, and well cultivated to *Lavenham*, and so on to *Hastead*; about which place the soil is chiefly clay, or clayey loam of a loose nature, hollow and damp: lets from 9s. to 20s. an acre; average about 14s. 6d. Farms rise from 20l. to 130l. a year. The course of crops on their stiff land, is

- |           |           |
|-----------|-----------|
| 1. Fallow | 3. Barley |
| 2. Wheat; |           |

and a vile one it is. On the lighter land;

- |            |           |
|------------|-----------|
| 1. Turnips | 3. Clover |
| 2. Barley  | 4. Wheat; |

which is far different. They plough five or six times for wheat, sow 2 bushels, and reap on a medium 2  $\frac{1}{2}$  quarters. For barley

ley they stir 2 or 3 times; sow 4 bushels, and 3 quarters the average crop. For oats they plough but once, sow 4 bushels, and reckon the mean produce  $3 \frac{1}{2}$  quarters. *Edward Manning* of this place has had 40 quarters from 4 acres; and *Michael Mortlock* 15 quarters an acre, which is the greatest crop I ever heard of. They plough but once for pease; sow 2 bushels an acre; very seldom hoe them; the crop  $2 \frac{1}{2}$  quarters.

For turnips they plough five or six times; hand-hoe twice; and reckon the mean value 40s. an acre; use them for sheep, and some few for fattening beasts.

Clover they both feed and mow for hay; get from 20 to 30 C. wt. an acre at one cutting. Some they feed; get 4 bushels an acre on an average, sometimes 8. They reckon the wheat as good after seed as hay, but rather better after feeding than either, but never so clean.

Folding sheep is never practised. But all the farmers chop their stubbles, and stack their hay at home; and some bring dung from *Bury*.

Many of them are very good farmers in

the article of draining: They make all covered drains; 32 inches deep;  $2\frac{1}{2}$  inches wide at bottom, and a spit at top; the price of digging and filling from 3 *d.* to 4 *d.* a rod: but of late years they have got into the way of ploughing the first spit, by going a bout or two with the common plough, and then digging one or two spits, in which manner they pay only 2 *d.* a rod. They fill first with bushes, and then with wheat tubble.

The best grass-land lets at 20 *s.* an acre; they apply it all to the dairy; and reckon that an acre will carry a cow through the summer. The breed, a little mongrel sort; they give on an average 4 gallons of milk a day; but good ones 8 gallons; the annual product 5 *l.* They understand very well the management of hogs depending on sows; for they keep at the rate of 2 sows, and all the pigs bred by them, to every 10 sows. The winter food of their cows is straw, with some hay and turnips at calving.

Their flocks rise from 20 to 80; the most common sheep husbandry is to buy old crones as they call them, that is, old ewes, in *September*, at from 5 *l.* to 8 *l.* a

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score. These they keep a year, and sell the couples fat from 16*l.* to 19*l.* a score.

In their tillage, they reckon 6 horses necessary to 100 acres of ploughed ground use 2 in a plough, and do an acre a day. The annual expence of a horse they reckon at 7*l.* They do not break up their stubble till after barley sowing. The price of ploughing 4*s.* an acre; the depth 4 or 5 inches. They all cut straw into chaff.

They calculate 400*l.* to be requisite for stocking a farm of 100*l.* a year.

Land sells at 30 years purchase.

Poor rates 3*s.* in the pound: the employment spinning wool, at which a woman earns 4*d.* a day. They all drink tea.

The farmers carry their corn 25 miles.

The particulars of farms.

160 Acres in all	1 Maid
120 Arable	3 Labourers
40 Grass	24 Acres Whea
£. 108 Rent	24 Barley
8 Horses	24 Fallow
10 Cows	24 Clover
6 Young cattle	10 Turnips
60 Sheep	14 Pease and
1 Man	beans.
1 Boy	

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*Another :*

150 Acres in all	1 Boy
75 Arable	3 Labourers
75 Grass	2 Men
£. 120 Rent	20 Acres Wheat
6 Horses	20 Fallow
20 Cows	10 Barley
5 Young cattle	10 Clover
50 Sheep	5 Turnips
2 Maids	10 Oats.

From *Hadleigh*, another way, I took the road to *Maningtree*, through a country rich and very well cultivated. In that part towards *Hadleigh*, the husbandry is pretty much the same as in the account I gave above. About *Maningtree* it resembles the methods around *Ipswich*. They use much rich marle from *Kent*, which is brought by shipping; they call it chalk.

At the village of *Lawford*, very near to *Maningtree*, lives a most ingenious smith, Mr. *John Brand*; whose mechanical abilities would do honour to a superior station. He has invented various implements of husbandry, of which I have myself had near seven years experience, and will venture to assert that he has failed in no-  

P 2
thing.

thing. Among other things, he makes an iron swing plough, to be drawn by a pair of horses, which much exceeds any plough I have yet seen, in cutting a true, regular furrow, well cleared of the loose moulds; or in turning over grass land; at the same time, that in strength and duration it is far preferable to all. The ease and simplicity of the variations are excellent. He has also invented other iron ploughs for 4 and 6 horses, for ploughing from 1 to 2 feet deep.

Another machine of very great utility, is an horse-rake on wheels, for raking spring corn stubbles, which performs in a very complete manner, and will in level fields rake hay.

Likewise a hand-mill for grinding wheat, which answers (as I have been informed by several persons) exceedingly well.

He has made several other tools, that have been tried and approved by many farmers. He has so quick a comprehension in these matters, that I have but little doubt but he would execute any new idea started to him with uncommon success. Describe the powers required, and the force you will

will allow, and I believe no man in *Britain* will sooner perform it.

I cannot but recommend this very ingenious mechanic to the attention of the public;—he has abilities far superior to the obscurity in which he lives.

From *Maningtree* to *Colchester*, the country is all rich and excellently cultivated. I made enquiries into it, and found their methods quite similar from thence beyond *Colchester*. About that town, and most of the way to *Witham*, they excell greatly.

About *Lexden* and *Stanway*, farms rise from 20*l.* to 1000*l.* The soil is a sandy gravel, with some brick earth; lets from 12*s.* to 20*s.* an acre. From *Colchester* to *Witham* about 13*s.*

The course of crops,

- |            |                  |
|------------|------------------|
| 1. Turnips | 3. Clover 1 year |
| 2. Barley  | 4. Wheat :       |

and sometimes the following crops added to these;

- |                   |           |
|-------------------|-----------|
| 5. Beans or pease | 6. Wheat. |
|-------------------|-----------|

After beans, they plough twice or thrice for wheat; sow 2  $\frac{1}{2}$  bushels an acre, and reap 3  $\frac{1}{2}$  quarters on an average; they have sometimes to 5  $\frac{1}{2}$  quarters; but it is all

hand-hoed. They stir their turnip land four times for barley; sow 4 bushels, the end of *March*, and through *April*; the mean produce 6 quarters. For oats they plough from once to 3 times; sow 5 bushels, and gain from 6 to 10 quarters; 8 the average.

Their turnips they always hand-hoe twice; the crops are generally worth 3*l.* an acre. One acre will fatten a beast of 40 or 50 score in the field, to eat the turnips on the land.

For pease they give but one earth; sow 2 bushels an acre, hoeing them into drills at 3*s.* or 3*s.* 6*d.* an acre expence. They hand-hoe them thrice, so as to keep them as clean as a garden; the expence is 3*s.* the first hoeing; 2*s.* 6*d.* the second, and 2*s.* the third. The average produce 4 quarters; sometimes they get 5 or 6. They likewise plough but once for beans; dibble them in, in rows 9 inches asunder; 2 bushels of seed *per* acre; and always give the same hoeing as to pease, and at the same expence. The crops are never small, generally from 5 to 10 quarters an acre; average



rage 6 or 7. Use both the horse and tick bean.

Coleseed they sow both for food and the feed; they feed it in *April* with sheep and swine, after the turnips are gone, and then plough it up for a crop of turnips.

Much of their clover is fed by sheep, hogs, and horses; when they mow for hay, they get great crops; 2 loads an acre at a cutting, and sometimes 3; and reckon that an acre in food and hay, pays 4*l.* 4*s.* on an average. A good deal of chalk is used about *Colchester*, and all the way to *Maningtree*; and likewise yet more towards and about *Maldon*: It comes all from *Kent*. The farmers give 7 to 8, and 9*s.* a waggon load for it; and many of them fetch it several miles; even from 6 to 10. They lay 7 loads an acre, and all agree that it lasts longest, and at the same time does best on stiff lands: the sandy and gravelly loams are not so profitable to chalk as the clayey ones, and stiff clays: on the latter it lasts from 30 to 40 years; but on the former it holds good for 15 years. I have, with them, called it chalk; but I found from trial that it is a very rich marle.

Great quantities of dungs of all sorts are brought from *Colchester*; the price 5*s.* or 6*s.* a waggon load, and they lay 7 or 8 on an acre.

All chop their stubbles; and stack their hay at home. But no folding sheep is practised.

Much foot is bought at 6*d.* a bushel; they sow it on their pastures.

Malt dust they sow on the barley tith.

In their tillage they reckon 4 horses necessary for 100 acres of ploughed ground; use 2 in a wheel plough, and do from 1 to 2 acres a day. They stir 5 or 6 inches deep; the price 4*s.* an acre: the stubbles are all broken up before *Christmas*.

In the hiring a farm of 300*l.* a year, they reckon 2000*l.* necessary to stock it, if the land is at all out of condition.

Land sells at 30 years purchase. Tythes are 3*s.* 6*d.* in the pound. Poor rates 3*s.*; in *Colchester* 6*s.* or 7*s.* In some parishes in that town they rise to 16*s.* or 17*s.*

Agriculture is here carried on in general with very great spirit; for the farms are chiefly large, and the farmers rich: some of them are worth from 30,000*l.* to 40,000*l.*; many above 20,000*l.*

The

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The following are the particulars of a farm.

400 Acres in all	8 Cows
360 Arable	90 Acres Wheat
40 Grass	90 Barley
£.330 Rent	90 Clover
12 Horses	90 Turnips.

From *Witham* towards *Chelmsford*, about *Boreham*, &c. the soil is heavier than at *Colchester*; being a mixed clayey loam; lets from 10 s. to 12 s. Farms are from 100 l. to 150 l. a year.

The course,

- |            |           |
|------------|-----------|
| 1. Turnips | 3. Clover |
| 2. Barley  | 4. Wheat. |

Here the good farmers stop; but bad ones add,

5. Oats.

The products :

Wheat, 3 quarters.

Barley, 5 ditto.

Oats, 6 ditto.

Pease, 3 ditto.

Beans, 5 ditto.

Both pease and beans are all hand-hoed. Many turnips cultivated on clayey soils too heavy

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heavy to feed off, but they draw them for sheep, cows, and beasts.

A great spirit of manuring is found throughout all this country. They bring some chalk from *Maldon*; give 8*s.* to 10*s.* a waggon load for it, and lay from 6 to 8 loads an acre: 6 or 7 miles carriage makes this so great an expence, that they have of late years tried to substitute their own clay for it: they lay 60 loads an acre; and from the observation they have made, think it will last a lease of 21 years.

Lime they also use; lay a bushel to a square perch; it lasts 7 years; but more, if mixed with dung and earth.

## L E T T E R XVI.

**B**EFORE I proceed in my journey, I shall here make a pause, to observe in general, that part of the country through which I have lately passed, is as remarkable for excellent husbandry, I apprehend, as any in the kingdom. The uncommon exertions of spirited culture on the sands near *Woodbridge*, I have already remarked: The great fertility of the soil, and the incomparable use they make of it, I have observed above; particularly their course of crops being so well adapted to keeping the land free from weeds: the culture of carrots; the drill and hoeing management of pease and beans; the singular use of crag as a manure; their noble breed of horses, with several other particulars, that stamp an excellence seldom found among common farmers.

After this country, comes the tract of land in the neighbourhood of *Ipswich*, which is cultivated in a very complete manner,

manner, and a spirited use made of various manures. Most of *Sandford* hundred boasts a husbandry of a superior kind; marle is much used; great things are done with the assistance of sea ouze; at the same time that all other manures are perfectly well understood. From *Maningtree* to *Colchester*, and thence to *Witham*, the farmers are perfectly enlightened; throughout this tract as well as the last, all the pease and beans are kept as clean by hand-hoeing, as turnips in other places, but at a much greater expence; wheat also receives the same operation, which I think is a certain mark of the farmers having extreme just ideas of husbandry; for without such, they would never arrive at so unusual a practice. Marle, called chalk here, they use, I believe, at a much greater expence than any people in the kingdom; for many of them go from 6 to 10 miles, and give from 8s. to 10s. a waggon load for it: this is acting with a spirit that cannot be exceeded. Town manures at *Colchester* sell at 5s. a load: foot, &c. &c. are used in large quantities; and these noble exertions are

the effect of low rents, as some fondly  
 imagine they must every where be; on the  
 contrary, this whole country is let at good  
 rents; that is, from 12s. to 25s. an acre:  
 in various places, in which all these cir-  
 cumstances unite, pay 16s. or 18s. an acre  
 and; and some 20s. Such a rent by no  
 means frightens these sensible men; they  
 expend great sums of money in the pur-  
 chase of manures, and spare no expence in  
 hoeing, notwithstanding that of rent.—  
 What is the consequence of this? Their  
 soils so thoroughly manured, produce  
 a crops without damage from weeds, for  
 perpetual hoeing totally destroys them.  
 The effect is answerable—from 4 to 5  
 quarters an acre of wheat; from 5 to 10 of  
 rye; from 6 to 10 of oats; 5 or 6 of  
 peas; and all other crops proportioned—  
 in farmers worth from ten to forty thou-  
 sand pounds. These shew sufficiently that  
 the above spirited practices form what  
 might emphatically be called TRUE HUS-  
 BANDRY. Those who exalt the agriculture  
 of *Flanders* so high on comparison with  
 VOL. II. P 7 that

that of *Britain*, have not, I imagine, viewed with attention the country in question. It is difficult to imagine common crops cultivated in greater perfect

LETTER



## LETTER XVII.

**F**ROM *Chelmsford* to *Dunmow* the soil is various, but chiefly heavy; near the former place it is all turnip land, but afterwards clay, at 12*s.* an acre.

From *Dunmow* to *Hockerill* it is all clay, at 15*s.* an acre: the whole country quite flat, and all hollow drained. I observed a large portion of the land was summer fallow, and ridged up in 3 feet lands ready for wheat, lying in a most neat and clean manner; but no turnips in the country. The borders of the arable fields are all dug away, from a foot to 18 inches deep, and carried on to the land, which drains the fields at the same time that much manure is raised.

The crops here amount nearly to the following products; Wheat, 3  $\frac{1}{2}$  quarters *per* acre; Barley, on summer fallow, 5 quarters; Oats, 6 quarters; Pease, 3 quarters; Beans, 4.

From *Dunmow* to *Braintree* the soil is chiefly clay; and lets at 15*s.*

From *Dunmow* to *Thaxted*, and from thence to *Clare*, the same; with some spots of turnip land.

From *Hockerill* to *Ware*, near the former place, the farmers are very neat; but they have some practices by no means defensible, though followed from an idea of good husbandry. They often sow barley after turnips, and then summer fallow for wheat; which is as extraordinary a course as ever I met with. I enquired particularly into the reason of ever omitting clover in such a case; and was answered, that clover fouls and spoils the land: however several of them have better ideas, and practise the excellent husbandry of, 1. Turnips: 2. Barley: 3. Clover: 4. Wheat; and they find it to answer extremely well. Land here lets at 15s. an acre: their crops are, Wheat, 3  $\frac{1}{2}$  to 5 quarters; Barley, 5 to 7; Beans, 3 or 4.

About *Youngsberry*, the seat of *David Barclay*, within 3 miles of *Ware*, the husbandry is various. Farms rise from 30*l.* to 300*l.* a year, but on an average are 100*l.* to 150*l.* The soil may be distinguished most properly into heavy and light; that

is,

is, turnip land, and such as will not bear that root. The rent at an average 12 s. an acre.

Their courses,

- |           |                   |
|-----------|-------------------|
| 1. Fallow | 3. Pease.         |
| 2. Wheat  |                   |
| 1. Fallow | 3. Beans and oats |
| 2. Wheat  | mixed.            |

*Also,*

- |           |           |
|-----------|-----------|
| 1. Fallow | 3. Pease. |
| 2. Barley |           |

*Likewise,*

- |            |           |
|------------|-----------|
| 1. Turnips | 3. Pease. |
| 2. Barley  |           |

They plough three times for wheat; sow 2 bushels and a peck, and gain 20 in return.

They plough, in summer fallowing, thrice for barley; turnip land but once; sow 4 bushels an acre in *March*, and gain 30 bushels on an average. For oats they give out one ear; sow 4 bushels, and reckon the mean crop at 4 quarters.

For pease they stir only once; sow 4 bushels, never hoe them; the produce at medium 16 bushels; 60 bushels were once produced by an acre, after turnip land barley.

Their culture of beans is, I think, a bad as in any part of *England*; they always mix them with oats. First, they sow 3 bushels an acre of beans, and some time afterwards they harrow in  $1 \frac{1}{2}$  of black oats; the crop of both, about 20 bushels.

The oats constantly shell, and are half lost before the beans are ready to cut; and to remedy this in part, they are induced to cut the beans too soon, and then as sure find them a thin and hollow sample: they own these disadvantages, and yet persist in such a slovenly method. I should also add that this custom quite excludes the more profitable one of hand-hoeing. It much behoves the good husbandmen of this country to discountenance so execrable a practice.

They plough thrice for turnips; hand-hoe them once, and eat the crops off with sheep: the average price, 35*s.* an acre.

They generally mow one growth of the clover crops, and feed one; the produce of the first  $1 \frac{1}{2}$  load of hay an acre: many keep it 2 years on the ground, but it is reckoned best to have it only one. Some mow twice for hay; get 1 load at the second

second cutting; and others leave it for feed: Wheat they reckon best after feeding.

In their manuring, they depend pretty much on folding sheep, but do not practise it in winter, except on very dry land. They fold once in a place: 230 sheep will do an acre in a week. They fold all sorts, but reckon a wether fold much the best.— They chop their stubbles for littering the farm-yards; and stack all their hay at home; not much for sale. Chalk they spread on their lands, about 20 loads an acre; it does best on heavy soils; lasts 6 or 7 years.

Ashes they sow on light land, chiefly on clover, 20 bushels an acre, and find the improvement great.

Malt-dust they use at the price of 7*s.* or 8*s.* a quarter; use from 3 to 4 *per* acre. Pidgeon's dung they spread on barley land, 20 bushels an acre; and find that it beats all other manures.

Under ground drains are common; they find the improvement remarkable. They splash their hedges, but have scarcely any ditches, even in the clay land.

Good meadow land lets at 30*s.* an acre;

they mow it all, and get  $1\frac{1}{2}$  load of hay an acre; two acres will keep a cow through the summer. A good cow will give 3 gallons of milk a day during half the season; and 5*lb.* of butter a week: the total annual produce 5*l.* They keep about 15 hogs to 10 cows. A dairy-maid will take care of 10. The winter food chiefly grafs, but hay at calving; they keep all in the yard except at calving. In fattening cattle, they buy in beasts in *August*, that are forward in flesh; they put them to the eddishes, and from thence to turnips, upon which they are kept four months; but they are drawn and thrown on grafs land; a beast of 100 stone (8*lb.*) will be fattened by an acre and half

Hogs fattened to 40 stone; but 26 the average.

Flocks of sheep rise from 100 to 400. The profit they reckon at,

Lamb,	-	-	0	8	0
Wool,	-	-	0	3	0
			<hr/>		
			0	11	0

The management of sheep is various. They buy in wethers, 2 years old, in *October*, or *November*, at 14*s.*; keep them one year; first they are put to stubbles

and then to some turnips; after that they have some clover, from which they are fold fat: they are folded all summer through.

The average fleece 6*lb.*

In respect to the rot, they hold that the distemper is by no means owing to a quick luxuriance of growth, distinctly taken, but to overflowings of grass land; no rot known but from the latter cause.

In their tillage, they reckon 4 horses necessary to 100 acres of arable land: they use 4 in a plough, with a driver; do an acre a day, from 4 to 5 inches deep; the price 6*s.* or 7*s.* an acre. The annual expence of a horse they reckon at 10*l.* 10*s.* The weekly allowance of oats, is 10 bushels to 4 horses. They do not break their stubble till after *Christmās*. Both wheel and swing ploughs used. The hire of a cart, 4 horses, and a driver, 10*s.* a day.

In the hiring and stocking farms, they reckon 1200*l.* necessary for 200*l.* a year.

Land sells at 30 years purchase.

Poor rates 3*s.* in the pound; 20 years ago were not 1*s.* 6*d.*; only 1*s.* in *Ware*, because they have a poor workhouse, wherein hemp is spun for ropes, and

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thread for netting and facking. Tythe are chiefly compounded; Wheat 4*s.* or 5*s.* an acre; Barley the same; Oats 2*s.* to 2*s.* 6*d.*; Turnips 1*s.* to 2*s.*; Clover 1*s.*

The employment of the poor womer &c. spinning, at which they earn 4*d.* day. All drink tea twice a day.

Most of the farmers have leases.

### LABOUR.

In harvest, 36*s.* to 40*s.* and board.

In hay-time, 1*s.* 6*d.* a day.

In winter, 1*s.* 2*d.*

Reaping, 4*s.* to 5*s.*

Mowing barley and oats, 1*s.* to 1*s.* 6*d.*

————— grass, 2*s.*

Hoeing turnips, 4*s.* to 5*s.*

Plashing a hedge, 4*d.* a rod.

Thrashing wheat, 3*d.* a bushel.

————— barley, 2*d.*

————— Oats 1  $\frac{1}{2}$  *d.*

————— pease and beans, 1*s.* for 5 bushel

Head-man's wages, 8*l.*

Next ditto, 7*l.*

Lad's, 3*l.*

Dairy-maid, 5*l.*

Other ditto, 4*l.*

Wome



Women *per* day, in harvest, 1 s. and board.

————— in hay time, 8 d.

————— winter, 6 d.

Value of a man's board, washing and lodging, 5 s. a week.

There is no rise of labour by the day; but the good labourers will only work by the piece, which was not the case formerly.

PROVISIONS.

Bread,	-	-	1 $\frac{1}{4}$ d. <i>per lb.</i>
Cheefe,	-	-	4
Butter,	-	-	8 $\frac{1}{2}$
Beef,	-	-	3 $\frac{3}{4}$
Mutton,	-	-	4
Veal,	-	-	5
Pork,	-	-	3 $\frac{1}{4}$
Bacon,	-	-	6
Milk,	-	-	$\frac{1}{2}$ d. <i>per pint.</i>
Potatoes,	-	-	3 <i>per peck.</i>
Candles,	-	-	7 $\frac{1}{2}$ <i>per lb.</i>
Soap,	-	-	6 ditto.

Labourer's house-rent, 40 s.

————— firing, breaking hedges and cutting trees.

The following are the particulars of a farm here.

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300 Acres in all	20 Oats
30 Grass	20 Pease
270 Arable	10 Clover
£. 180 Rent	20 Turnips
8 Horses	100 Fallow
8 Cows	3 Men
200 Sheep	2 Boys
20 Young cattle	2 Maids
40 Acres Wheat	4 Labourers.
40 Barley	

*David Barclay* of *Youngsberry* has executed some experiments in agriculture that are of consequence. I am much indebted to him for the following particulars, as well as the preceding account of the common husbandry around him.

## WINTER TARES.

*Experiment, No. 1.*

Upon a strong mixed soil, not so heavy that it would not do for turnips, ten acres were sown with winter tares, after barley, on one ploughing,  $2\frac{1}{2}$  bushels *per* acre. The second week in *May* they were begun for foiling horses: they lasted 25 horses 9 weeks, which, at 2*s.* 6*d.* a horse *per* week, come to 2*l.* 16*s.* an acre. No manure was

was used, and the tares were off time enough for turnips.

MANURES.

*Experiment, No. 2.*

A field of turnip land gravel was manured for wheat, with trotters from *London*, rabbits dung, and the sheep fold. Six quarters an acre of the trotters cost,

at 7s. a quarter,			£. 2	2	0
Carriage, 1s. 6d.	-	-	0	9	0

<i>Per acre,</i>			2	11	0
------------------	--	--	---	----	---

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Rabbit dung 10 quarters, at 2s.			1	0	0
---------------------------------	--	--	---	---	---

Carriage, 1s.			0	10	0
---------------	--	--	---	----	---

<i>Per acre,</i>			1	10	0
------------------	--	--	---	----	---

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The other folded; 40 herdles, 10 of each side, 8 feet each, for 230 sheep.

The effect was; the trotters produced 25 bushels *per acre*; the fold, 20 bushels; and the rabbit dung 15 bushels.

Trotters,				<i>Bushels.</i>	25
-----------	--	--	--	-----------------	----

Fold,					20
-------	--	--	--	--	----

<i>Superiority,</i>					5
---------------------	--	--	--	--	---

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Which at 5s. is 1l. 5s.

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Trotters,	-	-	25
Rabbits dung,	-	-	15
			<hr/>
Superiority,	-	-	10
			<hr/>

At 5s. is 2*l.* 10*s.*

It appears clearly from hence, that the trotters are vastly superior to the rabbit dung, and something better than the fold: indeed the rabbit dung is so small a produce, that one can hardly suppose it did any benefit at all.

*Experiment, No. 3.*

Coal ashes sifted fine, were compared with dung as manure for grass-land. 160 bushels *per* acre were spread, at 3  $\frac{1}{2}$  *d.* a bushel, all expences included. On the other part, 16 loads an acre of dung, quite black and rotten, that had been turned over and well mixed together. The result was, that the ash'd part produced a load and three quarters of hay *per* acre; the dunged  $\frac{3}{4}$  of a load: much white clover with the former, but none among the latter. Before the manuring, the products were not more than  $\frac{1}{2}$  a load an acre. I viewed the after-grass of the trial, and could

could trace exactly, by the thickness of the grass and the verdure, where the ashes were laid.

*Experiment, No. 4.*

Rape oil cake dust was tried on barley, sowed with the seed and harrowed in; 2 quarters *per* acre, at 15s. a quarter. The effect remarkably great; the crop 5 quarters *per* acre, which is much more considerable than ever seen on the land.

*Experiment, No. 5.*

Malt-dust Mr. *Barclay* has tried for barley; 4 quarters *per* acre, at 7s.; and from the appearance of the crop, has great reason to think that it answered well.

DRAINING.

*Experiment, No. 6.*

Above fifty acres of wet, heavy, loamy clay, and clayey soil, were drained in one winter by covered drains. The leading drains were cut 28 inches deep; and the branches 22 inches; 3 or 4 inches wide at bottom, and 9 at top. The digging and filling the 28 inch ones, 3*d.* a rod; and  
the

the 22 inch, 2 *d.* They were filled with black-thorn bushes at 9 *s.* a load, of 80 large faggots—3 loads did the drains of an acre of land, cut within a rod of each other. The improvement of these drains is strongly visible, though done only last winter.

### CABBAGES.

#### *Experiment, No. 7.*

Three acres of strong clay land were summer fallowed last year, and the beginning of this. The seed of the great *Scotch* cabbage, &c. was sown in *April*, and the plants set on 3 feet ridges, 2 feet from each other, the 24th of *June*. They were horse-hoed twice with a shim, which cuts the land without turning a ridge: the rows hand-hoed twice; and after that the furrows struck with a common plough, earthing up the plants.

The shim with one horse did 3 acres a day. Besides the great *Scotch*, some brown cole, and turnip cabbages were planted, all of which are in a very thriving condition, and to the honour of the cultivator, as clean as a garden.

DITCHING.

*Experiment, No. 8.*

By a comparison between the cutting a ditch with spades in the common manner, and ploughing it, it appeared that a ditch 30 rod long, cut by the spade,

cost	-	-	-	£. 3	0	0
						<hr/>

By ploughing, 6 horses and 20 men did 30 rods in one day.

20 Men,	-	-	-	1	3	4
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6 Horses,	-	-	-	0	12	0
						<hr/>

						1	15	4
						<hr/>		

The spade,	-	-		£. 3	0	0
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The plough,	-	-		1	15	4		
						<hr/>		

Superiority of the latter,				1	4	8		
						<hr/>		

In the labour of the 20 men, is included their paring down and finishing the sides of the ditch, and the bank. This is certainly a very considerable improvement, and deserves the attention of all who cut new ditches.

FATTING BEASTS WITH  
OIL-CAKE.*Experiment, No. 9.*

In 1769, ten oxen were bought and put to lint-feed cake.

They cost,	-	-	£.60	0	0
Commiffion,	-	-	0	15	0
Driving, &c.	-	-	0	8	0
December 30.—6250 cakes,	-	-	33	0	0
Carriage of 4 waggon loads, at 21 s.	-	-	4	4	0
November 6. to April 10. Four months hay, 6 lb. each <i>per</i> diem, at 40 s. a load,	-	-	10	14	0
Labour,	-	-	7	0	0
Two of them 3 weeks at grafs, at 6 s.	-	-	0	18	0
Four had an acre of turnips,	-	-	2	0	0
			<hr/>		
			118	19	0
			<hr/>		

*Produce.*

By 10 oxen received,	-	-	120	0	0
Expences,	-	-	118	19	0
			<hr/>		
Profit,	-	-	1	1	0
			<hr/>		

The



The beasts were well littered with straw, and raised a vast quantity of dung; they were stalled, and never let out; water was given in pails thrice a day. A thousand cakes, which come to 5*l.* 5*s.*, weigh 1 ton 7 *C. wt.* 3 quarters.

I must observe on this account, that the clear profit in money is by no means the object;—the dung is the great advantage. Those who can command straw, stubble, fern, or other litter, and can convert it into the richest dung without loss on the ox account, will make a very great profit in the high improvement of their land. No manure exceeds the dung of oil-cake fed beasts; it is the most fertile of all. Had Mr. *Barclay* bought the straw, and measured the dung, the truth of this observation would be sufficiently clear. But I must further remark, that the charge of 7*l.* for attendance seems very high. In a convenient ox-house that expence might be much reduced; witness the practice of Mr. *Moody* of *Retford*.

## HEDGES.

*Experiment, No. 10.*

In fencing, Mr. *Barclay* has made a trial of transplanting old quick stubbs to form a new hedge. He was very doubtful of their success, but none could thrive better: this reminds me of the same practised to a large extent by the Rev. Mr. *Hall* in *Yorkshire*.

## SPIKY ROLLER.

This implement (procured of *John Arbutnot Esq; of Mitcham*) has been used on some very strong cloddy land in summer fallowing with very great success; it reduced some very rough land, at twice going over, to a fine tilth, at a season when a plough could not have been of the least service. The expence of the operation as follows:

5 Horses,	-	£. 0	10	0
1 Man,	-	0	1	6
		<hr/>		
		0	11	6
		<hr/>		

It rolls  $1 \frac{1}{2}$  acre, twice in a place, *per* day;  
the

the expence consequently is 7*s.* 8*d.* an acre\*.

From the activity and judgment with which *David Barclay* begins his husbandry, the public has no slight reason to expect that it will be of general utility: his readiness in trying, and his accuracy in relating, will render his experiments very valuable.

At *Esfenden*, in the way from *Ware* to *Latfield*, Sir *William Baker* has built a barn, which is the most costly one I have seen. It is 84 yards long, 15 broad; the whole raised on cap stones, so that a mouse cannot get into it: The whole floor is equally hard for thrashing. The sides, &c. are boarded and painted blue, and the roof is slated.

I crossed

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\* *YOUNGSBERRY* is a plain neat edifice, built by *Mr. Paine*; the situation very beautiful, on the brow of a waving hill, scattered with trees. It commands a fine view of rich inclosures; various from the inequalities of the country.

In the vale, which winds at the bottom of the hill, *Mr. Barclay* has cut a large river, that enriches his prospect greatly, and gives the whole scene a liveliness which (however pleasing) it could not otherwise possess.

I crossed from *Hertfordshire* into *Surry* passing through *Clapham* † in the way to *Peterſham*, where I had the pleasure of viewing the farm of Mr. *Ducket*, whose mechanical abilities are so well known by the invention of two most excellent ploughs.

All his fields are sand, of two sorts; one very light and rather poor; the other moist, black, and good. Most of his arable

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† At this place Mr. *Thornton* has an ornamented paddock, laid out in an agreeable manner; in some particulars, different from the common method of sketching them. It consists of a varied lawn well scattered with single trees and some clumps, and so inclosed with wood to be perfectly rural, though so near *London*.

A gravel walk runs around the whole, and encompasses several meadows, to the extent of more than two miles. It is in most places shaded thickly with wood; and on one side very well broken with some old oaks, &c. that grow out of it. Almost in front of the house it leads to a *Gothic* bench, that is light and pleasing. At each end it concludes in a shrubbery, which joins the house, and is in several instances very beautiful: a small river winds through it, gently bounded by rising hillocks, and smooth green slopes, very well varied, and spotted with shrubs and trees in a judicious manner. The bends of the water are natural, and the union with the

le crops are cultivated in the drill method: his turnips, barley, oats, and wheat, are chiefly in rows: the turnips 12 inches to feet asunder; the wheat and oats from 9 to 12 inches, equally distant. He handles all these crops sufficiently to keep them clean; and finds, from repeated experience, that the crops are better than in the broadcast mode, at the same time that the land is

R 2

kept

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own and wood well imagined. To the right it seems lost in the retiring grove. These circumstances are all executed with real taste; and if a few others were a little altered, the whole place would (in its stile) be complete. Among others, the looking from the lawn on to a bridge, which on crossing, you find, has no connection with the water, the end of the river appearing full view;—this is not quite the thing.—The *evaux de frize* pales, with part of the lawn from the paddock, are too near the water, they cut a slip of mown grass along the banks, which is a mere edging; besides the pales themselves are seen, and that close appearance of *art*, and *boundary*, hurts the effect of the river.—Perhaps also, the benches in the walk are too frequent. As to the rock work grotto, it is (the lanthorn excepted) extremely well executed; but it is too wild a stile for a gentle stream, and a smooth shaven lawn spotted with shrubs;—it requires a romantic situation on the banks of a rapid stream tumbling over broken fragments.

kept much cleaner.—And one application of this mode is particularly useful:—he sows clover seed over his wheat or spring corn, just before the last hand-hoeing which operation covers the seed in the compleatest manner. I viewed the crops and found the clover as regular as possible.

Mr. *Ducket's* hedges are remarkably neat—they are of white-thorn only, very well plashed to secure them at bottom, and afterwards kept regularly clipped. The management of his borders, also, do him credit; he found them wide and quite overrun with bushes and rubbish; all this he has grubbed up, so that the plough goes quite to the hedge—the fields are the neater at the same time that much land is gained.

All the tillage of his land is performed with ploughs of his own invention: first with a trenching one with two shares, &c. that work one below another, paring off the turf or surface of the land, and turning it over; the lower one follows in the same furrow, and raising fresh earth buries the first. In this manner it cuts 12 inches deep with 4 horses, and does an acre a day. On

ver

ery important use of this plough, is the burying twitch in sand land. Mr. *Ducket's* method, when his land is run much to twitch, is to bury it so deep as to admit the succeeding tillage *above* it; a large quantity of twitch buried, turns to excellent manure; but if not sown with hoeing crops, it will not be destroyed; hand-hoeing with this management will totally destroy its growth; but while it is rotting, it holds the land together and is of great service. This method Mr. *Ducket* finds to be far preferable to ploughing shallow, and trusting to the harrows for tearing out the twitch. The other is a trebble plough on one bent team. It turns three furrows at once; works with 4 horses, and does from 3 to 4 acres a day.

I should give drawings of these most excellent implements, but the Register of the Society at *London*, is about to publish a work which will include them.

They answer the purpose extremely well; and not only on sand, but also on stiff soils, as I have been for some time a witness, in the fields of a gentleman whose husbandry I shall presently come to.—The trench

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plough costs 8*l.* 8*s.*; and the trebble one 9*l.* 9*s.*

The method in which he drills his crops of whatever sort, is the following. The land, when ready for the seed, is harrowed flat; then the drills are struck with a plough made on purpose.

See Plate VIII. Fig. 1.

From a to b. ——— 4 feet.

d — c. ——— 5 ———

a — c. ——— 0 8 inches.

f — h. ——— 4 0

f — g. ——— 2 4

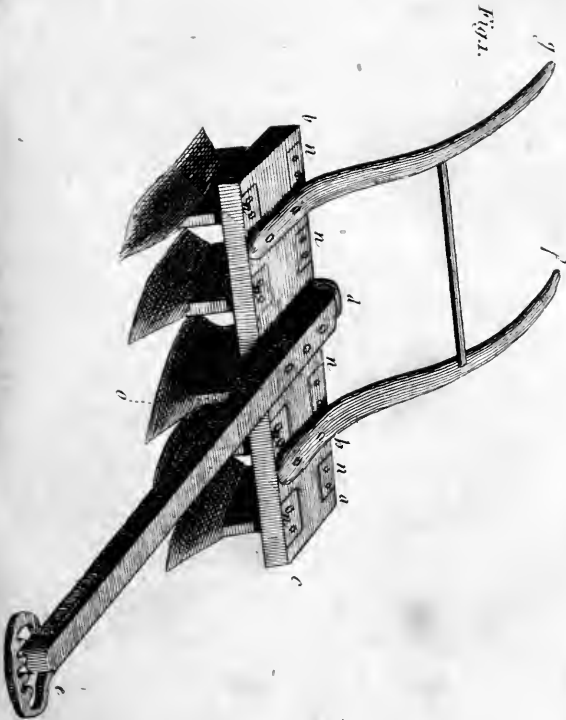
c — o. ——— 2 6

n. ——— screw holes to vary the

distances of the shares. The bottoms of the shares in the shape of a boat, and fixed with a narrow strip of iron; they are 12 inches thick, and 12 high from the ground.

For the furrows to be straight, the outward share goes in the last furrow of the preceding set. When they are made, the corn, &c. are sown broad-cast, and the land harrowed; nine tenths of it rise in the rows, and very regularly.—The price of it 3*l.*







Mr. *Ducket's* best meadow on the banks of the *Thames* (an excellent one for cows) consists at least half the herbage of burnet : the rest vernal, white clover—cow grass—wild trefoile—and narrow leaved plantane.\*

As to the common husbandry about *Richmond* and *Petersham*, it is difficult to  
give

\* *RICHMOND* Gardens have been lately altered: the terrass and the grounds about it, are now converted into a waving lawn that hangs to the river in a most beautiful manner: the old avenue is broken, and the whole clumped in some places with groves; in others with knots of trees, and a very judicious use made of single ones: no traces of the avenue are to be seen, though many of the trees remain. The lawn waves in a very agreeable manner, and the wood is so well managed, that the views of the river vary every moment. A gravel walk winds through it, which commands the most pleasing scenes. The river, noble as it is, is not the only object that feasts the eye; on the other side of the walk the grounds are thrown into such various forms, that they no where fatigue the eye; in one place the lawn spreads over a most beautiful vale, and breaks among the woods, in a stile that must command attention; in some spots retiring into the groves, and contrasting its lively green with the darker shades of wood;—in others it swells into gentle hillocks scattered with single trees, and rises into a hill that compleats the inequality

give an account of it; the greatest part of the country is occupied by the seats, gardens, and lawns of the nobility and gentry: the few farms here, rise from 40*l.* to 200*l.* a year; in general about 60*l.* 80*l.* or 100*l.* a year. The soil of two sorts, either stiff loams,

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of the spot: a flock of sheep scattered about the slopes, add uncommonly to the beauty of the scene. It is, on the whole, a mild agreeable landscape, which seems created by the hand of unpretending Taste.

After this, the walk retires into thicker plantations, and winds through them with as much variety as the ground affords; the wild shrubby land is well managed, and contrasts the more dressed parts of the garden.

At *Kew* are many very fine exotic plants: with a great variety of trees not common.

The view from *Richmond* hill would figure in the finest parts of the north of *England*, where a bolder inequality of country presents such amazing scenes. The noble bend of the river at the foot of the hill, which presents so fine a sheet of water, is well contrasted by thick woods; and the islands give a striking variety to the scene. The surrounding country is rich, and cut into innumerable inclosures; nor are there more houses than sufficient to throw a cheerfulness over the whole; a fortunate circumstance so near *London*. But the point of view being quite a town is very unhappy.

loams, tending pretty much to clay, or mere sands; some of the latter do not let at more than 10*s.* or 12*s.* an acre; the meadows let at 40*s.*—the average of the neighbourhood, from 20*s.* to 25*s.*—As to the courses of crops, they are as various as the private opinion of every farmer; but in general, they croud in crop upon crop as fast as possible. Wheat and rye produce 3 quarters; Barley 4; Oats from 2  $\frac{1}{2}$  to 10; the average 5; Tick beans, on their strong land, 4 quarters. They hoe their turnips but once; and reckon the value 40*s.* to 3*l.* They mow much of their clover for foiling; it yields in hay, at two cuttings, 3  $\frac{1}{2}$  loads.

### LABOUR.

In harvest, 2*s.* 6*d.* a day and board.

In hay-time, 2*s.* and beer.

In winter, 1*s.* 6*d.* to 1*s.* 8*d.*

Reaping, 7*s.* to 16*s.*

Mowing barley, 1*s.* 6*d.* to 4*s.*

Mowing, making, carrying, and stacking hay, 10*s.* 6*d.*; but the farmer finds a loader.

Hoeing turnips, 6*s.*

Men's

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Men's wages, 8*l.* 8*s.*

Lad's, 2*l.* 10*s.* to 4*l.*

### PROVISIONS.

Bread,	-	-	1 $\frac{1}{4}$ <i>d.</i> per pound.
Cheese,			4 $\frac{1}{2}$
Butter,	-	-	9
Beef,	-	-	2 $\frac{1}{2}$ <i>d.</i> coarse joints.
Mutton,			4 $\frac{1}{2}$
Veal,	-	-	5
Pork,	-	-	4 $\frac{3}{4}$
Bacon,	-	-	8
Milk,	-	-	1 <i>d.</i> per pint.
House-rent,			5 <i>l.</i>

## L E T T E R XVIII.

I Proceed to the register of the experiments of *John Arbutnot*, Esq; of *Ravenbury*, with the satisfaction of knowing that I shall lay before the public, as useful knowledge as was ever yet received in the walk of husbandry. Their genuine merit renders any further introduction unnecessary.

The most familiar method of arranging them will be under the following heads.

- I. LAYING LAND TO GRASS.
- II. THE CULTURE OF LUCERNE.
- III. THE CULTURE OF Madder.
- IV. EXPERIMENTS ON THE DRILL CULTURE OF SEVERAL CROPS.
- V. EXPERIMENTS TO ASCERTAIN THE BEST COURSE OF CROPS.

## VI. MISCELLANEOUS EXPERIMENTS.

## VII. IMPLEMENTS.

## I. LAYING LAND TO GRASS.

*Experiment, No. 1.*

In 1756, seventeen acres were laid down with oats, succeeding a summer fallow; the seeds used were,

- 2 Sacks *London* hay seeds;
- 20 lb. of white clover.

The two first years the product was very good, amounting to 2 loads an acre of hay; but it declined much afterwards. The grasses that appeared, consisted chiefly of meadow poa—red robbin—some *daëtilus*, or orchard grass—and a small proportion of ray-grass. The white clover disappeared quite, owing to the wetness of the land preventing its trailing branches striking root. Four of these acres were hollow drained in 1766, which has gradually improved the herbage, insomuch that those parts in which the white clover died away, are now thickly covered with it.



*Experiment, No. 2.*

Mr. *Arbutnot* has laid, at different times, 70 acres, in various methods:—  
 first, 31 acres, with oats, on a summer fallow; the feeds,

20 *lb.* of white clover;

10 *lb.* of lucerne;

And 1 bushel of ray-grass.

This field, for two years after the first laying, produced 2 loads of hay *per* acre; but since that time (ten years ago) it has gradually diminished. The white clover has disappeared, except in dry patches, which has been owing to the wetness of the soil. After the first year, the lucerne has never made any appearance; but the ray-grass has kept its ground.

The goodness of the crops the two first years, Mr. *Arbutnot* attributes to the staple of the ground being then pervious to the rain, and consequently draining itself; but when the land subsided, the water was retained on the surface, to the destruction of the tender grasses. The white clover is a plant that trails on the ground, but does not strike root except in spots dry enough to admit it; which was

the occasion of the above-mentioned partial failure. These 31 acres have since been drained by under-ground cuts, which has brought the white clover in much greater abundance.

In 1766, it was manured at the rate of 30 loads an acre with river mud, in which were many small shells. No benefit was seen the first year; which he attributes to the servant having injudiciously rolled it with an heavy roller in the spring when too wet: this manuring was before the draining; the mud took no effect till after that operation.

In the wettest parts of the field there appeared a very pernicious grass called red robbin; in arable land, the *Surry* farmers call it water-grass: it is there very difficult to extirpate; for though only fibrous rooted, yet burying will not destroy it; it must be extracted like couch: in grass land it comes very late, and yields nothing.

*Experiment, No. 3.*

Ten other acres were likewise sown with oats on a fallow; the seeds,

2 Sacks

2 Sacks of hay seeds from the Horse Guards, chiefly consisting of crested dog's tail—narrow leaved plantane—barley grafs—and innumerable daisies.

20 lb. White clover.

This field has continued a good pasture, without declining like the preceding ones; but it has not produced a good burthen of hay. The reason of its not falling off after the second year like the rest, is the soil being a black loam, which does not subside into so retentive a mass as the other wetter lands. The product of the hay being but small, arose from most of the above mentioned grasses running chiefly to bents, instead of thickening on the ground like many other sorts.

#### *Experiment, No. 4.*

Seven acres more were sown with tares; the stubble ploughed up and hollow drained; oats thrown in at spring, and with them 2 sacks an acre of *Suffolk* hay seeds, and 20 lb. white clover. The whole was manured after the oats were off. This has proved a good pasture ever since, and has yielded large crops of hay, but the grafs has consisted chiefly

chiefly of the *holcus*, believed to be a very bad sort—some *daëtilus*—a small quantity of meadow fescue—and a little meadow fox tail, and great poa;—and it is remarkable that no vernal has appeared.—This field has remained quite dry ever since, even in the depth of winter—though the same soil undrained has been too wet for cattle to stir on.

*Observation.*

Mr. *Arbuthnot* remarking that ray-grass generally run to seed before the white clover made any bottom in the spring, and especially on land undrained; he has usually fed the pasture until the end of *May*, and then laid it by for hay. This conduct has given the white clover time to bottom, so that he has often mown a load of hay an acre on land, which, in other management, would not near equal the produce. A hint that may prove very useful to many cultivators;—for feeding ray-grass late in the spring without damaging the crop of hay is a very great acquisition in sheep feed.

## II. LUCERNE.

*Experiment, No. 5.*

In the year 1759, twelve acres of a black, deep, sandy loam were sown with barley, after turnips, and with it 10 *lb.* *per* acre of lucerne broad-cast. The corn was mown and carried; but nothing done to the lucerne.

1760.

This year it was mown for foiling horses, &c. but the produce weak; not considerable enough for a particular valuation.

1761.

This year the crop came to perfection. Early in the spring it was cross ploughed with a round share, and harrowed. Mowed three times, each time for hay; the product of the three, four tons *per* acre of the best hay ever used. The team men would not at first use it; but they were at last so prejudiced in its favour, that when done, they lamented the loss. After the mowings, there was an aftermath, which yielded some food for cows and sheep. Between each cutting it was harrowed; and likewise

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in autumn. The average price of common hay is 45s. a load; but Mr. *Arbutnot* valued this of lucerne at 55s.; in which valuation his men agreed.

1762.

This year the culture was the same as the preceding, and also the crop; it was again mown thrice.

1763.

The same culture and product: a latter growth the end of *September* was cut off in one night by a slight frost: hardy as the plant in general is, yet the shoots are extremely tender; they will bear no frost. The natural grass made so formidable an appearance, that the autumnal harrowing was omitted, from an idea that it would be ineffectual.

1764.

In the spring of this year, one acre was ploughed up and planted with madder; the remaining eleven were mown twice, but had no harrowing; the product 44 tons of dry hay; but more than half was in the first crop, and much of it natural grass.

1765.

In this spring, ploughed it up for mad-  
 der; the lucerne declined, owing, as ap-  
 prehended, to a want of more regular and  
 severe harrowing, as it has been found  
 that the severest operation of that sort will  
 not damage the plants. *Rocque's* harrow  
 was used.

In respect to making it into hay; the  
 lucerne is so stalky that it does not settle  
 down; it was therefore stacked very green  
 -the heat that results from sap (not wet) is  
 beneficial. It was always cut as soon as  
 there appeared a general scattered bloom.

*Expences and Produce.*

160. Rent, - -	£.1	0	0
Tythe and town charges,	0	6	0
Three ploughings -	0	13	6
Seed and sowing, -	0	12	0
Three harrowings, -	0	4	6
Mowing, &c. -	0	5	0
		<hr/>	
		3	1 0
By green food, -	1	0	0
		<hr/>	
Loss, - -	2	1	0
		<hr/>	

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1761.	Rent, &c.	-	£. 1	6
	Ploughing,	-	0	4
	Four harrowings,	-	0	6
	Mowings; first,	-	0	3
	second,	-	0	1
	third,	-	0	1
	Making, raking, carting, and stacking thrice,		1	0
			<hr/>	
			3	2
			<hr/>	
	By 4 loads of hay, at			
	55s.	-	11	0
	After-grass,	-	0	5
			<hr/>	
			11	5
	Expences,	-	3	2
			<hr/>	
	Clear profit,	-	8	2
			<hr/>	
1762.	The same as in 1761:			
	Product,	-	11	5
	Expences,	-	3	2
			<hr/>	
	Profit,	-	8	2
			<hr/>	
1763.	Rent, &c.	-	1	6
	Three harrowings,	-	0	4
	Mowing,	-	0	6
	Making, &c.	-	1	0
			<hr/>	
			2	16
			<hr/>	



# THROUGH ENGLAND. 261

By 4 loads of hay,	£.	11	0	0
Expences,	-	2	16	6
Clear profit,	-	8	3	6

764.	Rent, &c.	-	-	1	6	0
	Mowing twice,	-	-	0	4	6
	Making, &c.	-	-	0	15	0
				2	5	6

By 4 loads of hay,	-	11	0	0
Expences,	-	2	5	6
Clear profit,	-	8	14	6

761.	Profit,	-	-	8	2	6
762.	Ditto,	-	-	8	2	6
763.	Ditto,	-	-	8	3	6
764.	Ditto,	-	-	8	14	6

				33	3	0
760.	Lofs,	-	-	2	1	0

Profit in 5 years,	-	31	2	0
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Which is <i>per acre per ann.</i>	6	4	4
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And on the 12 acres,	74	12	0
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Wheat, to equal this profit, must yield quarters an acre, and that *every year*. If

this does not prove the vast profit of lucerne; nothing can. Nor should we condemn for lasting no longer a grass that will continue four years in such full perfection. In other methods of culture it has remained much longer—but that is not the least reason for rejecting a shorter duration. Such a culture may possibly be found more beneficial than the more lasting, and at the same time more expensive modes;—for such a term of five years, in a course of several crops, will be found uncommonly profitable.

Mr. *Arbuthnot*, from the experience of this crop, as well as more general observation, recommends the broad-cast culture of lucerne intended for hay, because it is necessary that the ground should be quite covered with plants, to prevent the dirt and dust sticking to the hay. But if it is designed for soiling, then he recommends drills equally distant, 18 inches asunder. It is absolutely necessary to harrow it cross and cross in both spring and autumn; should be done till the land has the absolute appearance of a fallow, and also be manured every autumn, before the harrowing, with fine rotten compost. The spring harrowing

as early as the season will admit; if the young shoots spring before you can get on; do not therefore desist from harrowing; you had better destroy them totally than omit that operation, which is essential to the goodness of the crop.

*Experiment, No. 6.*

In order to determine in what degree lucerne will bear very rough treatment, this gentleman wounded many plants in a severe manner, quite to mangling them—others he cut off 3 inches below the ground; the result was, that the latter plants were absolutely killed, but the former not in the least hurt: the fact is, that the bulb may be wounded in any degree; if the least bit remains it sprouts presently; but cut it quite off, and you destroy the plant.

### III. THE CULTURE OF MADDER, &c.

Mr. *Arbuthnot*, on his applying to husbandry, formed a general idea of the means of rendering it profitable. It appeared to him that common crops managed in a common manner, could not to a gentleman

yield the same advantage as to men who attend to the lowest minutiae of the business, and live as much by frugality as agriculture. In such a stile of husbandry he thought it not desirable to emulate them, but rather to apply to the culture of such rich vegetables, as would yield a profit considerable enough to pay for an accurate expensive culture; which would not only be more beneficial, but at the same time require much less trouble and fatigue—and not be liable to the numerous casualties and impositions to which common crops are so universally open.

Among other plants, Madder attracted his attention, as an article of culture that has as few objections to it as most others—it remains several years in the ground, consequently is less complex in its management than such annual ones as hops—it is liable to few accidents—and pays excellently for a perfect culture: large quantities being constantly imported from *Holland* to answer our own demand, and the *Dutch* growing most of it themselves, and having by monopoly raised it to a most extravagant price, he determined with the spirit which real prudence

prudence dictates, to take a journey into *Flanders* to examine the soil there preferred for madder, and their management of the crop. Afterwards, in a journey through *Holland*, he also made enquiries into the conduct of the crops, and the method of manufacturing it; having obtained admision into their stoves, where he found a management more expensive, but no ways preferable to what is practised by many in *England*; this he did that he might enter upon the culture himself, with that knowledge of the business which was requisite for avoiding great errors. Ill success in such pursuits, is more often owing to hasty, premature attempts, than to really natural obstructions—It is oftener the moral, than the physical capability that is wanting.

During his stay in *Holland*, he examined their madder grounds with the minutest attention; made every requisite enquiry for gaining as complete a knowledge of the culture as possible—and from thence was convinced of the propriety of attempting it at home. He took the opportunity of being in that country, to make himself further acquainted with husbandry in general. He travelled through all the provinces, and like-  
 wife

wife that region of good husbandry, FLANDERS, and being perfectly acquainted with the *Dutch* and *French* languages, he was able to gain whatever information he wanted; accordingly he has introduced several practices on his own farm, the hint of which he caught in *Flanders*.

*Experiment, No. 7.*

He began his undertaking with trying one acre in the year 1765. The soil a deep black loam. It was dug 18 inches deep in *March*, and planted with winter plants—that is, with parts of the runners and crown of the root on which the buds are made for that year's growth. The rows were equally distant, 18 inches asunder, and 6 inches from plant to plant. As soon as the shoots were 10 inches high, the plantation was hand-hoed; which operation was repeated twice more during the summer, so as to keep the land quite free from weeds.

1766.

In the spring of this year, as soon as the shoots appeared, they were earthed up with hand-hoes; and when 8 inches high, they

they were most of them drawn for planting other land; after which the rows were earthed again: as soon as the fresh shoots were 8 inches high, they were drawn again—and after another earthing, the same for the third time. In autumn the beds were earthed again, and the haulm that remained, buried, by digging earth in the intervals and spreading it on the rows.

1767.

In this spring, plants were once drawn off and earthed as in last year; also hand-hoed twice. In autumn the crop was dug up with spades, and the madder clean picked: but the produce not exceeding 10*l.* value; which was owing to the great damage the plants received from having fetts so often drawn from them.

*Expences.*

1765.	First digging,	-	£.8	0	0
	Planting,	-	1	1	0
	Plants,	-	15	0	0
	Hand-hoeing thrice,	-	1	10	0
1766.	Hand-hoeing; thrice				
	earthing at the same				
	time,	-	1	10	0
	Carry over	-	27	1	0

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	Brought over,	£.27	1	0
	Digging the intervals,		1	0
1767.	Hand-hoeing thrice,		1	10
	Taking up, -		8	0
	Three years rent, tythe and town charges, at 1 <i>l.</i> 6 <i>s.</i> - - -		3	18
	Total expences,		41	9
	<i>Produce.</i>			
	Value of the crop, -		10	0
	Loss, -		31	9

The balance is here called loss; and improperly, because this acre was but a nursery for succeeding crops; the value of the plants drawn from it, amounted to 9*l.*; it should here, therefore, be esteemed the mere price of the sets for the succeeding plantations.

From this experiment two very useful facts are gained: first, the expence of cultivation by digging, where no manure is wanting, and the plants not purchased, amounts, on land of 20*s.* to 26*l.* 9*s.* per acre, including the expence of twice digging; but if the same ground was again planted, the total would of course be less.



Hence we find, that 6 *C. wt.* of madder, at 4*l.* a *C. wt.* will pay the expence of such cultivation.

Another circumstance of great consequence, is the damage the crop received by drawing plants from it—even to the total destruction of the profit. This offers a lesson for the cultivators of madder, not to be free in taking plants from their crops.—If their plantations are annually increasing, all may possibly be spoiled by drawing: does it not therefore seem expedient to leave part \* of the crop, enough as you judge for a supply of plants till the spring planting is over, and then take it up instead of the autumn preceding.

*Experiment, No. 8.*

Seven acres of a sandy loam (a barley stubble) was ploughed at *Michaelmas* with a strong wheel plough, 14 inches deep. Upon this ploughing it was manured with 10 loads (40 bushels each) an acre of farm-  
yard

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\* One acre of very good madder will yield plants enough for ten.

yard manure, which was turned in by landing up for the winter on to 3 feet ridges.

1766.

The beginning of *March* ploughed it again; reversing the ridges thrown up the preceding autumn. The same month they were planted with winter \* plants, a single row on each ridge; the plants 18 inches asunder. The method used in planting was to draw furrows with hand-hoes, and then the sets were laid in them, and covered also by hoes. Most part of the field miscarried; owing to an unusual quantity of rain falling, and the spring ploughing being given while the land was wet. The whole was therefore ploughed up, and in *May* it was again planted with spring plants, bought at 8*s.* per thousand; the

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\* Winter Plants, are that part of the root on which the eyes are made; which are cut in lengths of 2 or 3 inches, in the same manner as hop plants.

Mr. *Arbuthnot* does not approve their use, because they remain so long in the ground that they are subject to rot, especially if it be moist: and this he attributes to their wanting the support of fibres which they had when on the mother plant; and though from their great succulency they will vegetate, yet they are very subject to decay from moisture.

the rows 2 feet by 18 inches; which is 15000 *per* acre; they were dibbled in. During the summer, the plants were kept clean by three hand-hoeings; and in the autumn the rows were covered by earth dug in the intervals.

1767.

This year the field was hand-hoed twice.

1768.

And again the same in 1768. In autumn it was ploughed up with the great wheel plough, to the depth of 18 inches, with 12 horses. Men followed the plough with pronged forks to throw the madder out of the furrows, and women and children followed to pick it up. The produce 4 tons 4 *C. wt.* on the 7 acres, at 4*l.* 10*s.* *per C. wt.*

*Expences per acre.*

1765.	First ploughing,	-	£.1	4	0
	Manuring,	-	3	10	0
	Landing up,	-	0	7	6
1766.	Spring ploughing	-	0	7	6
	Planting,	-	1	0	0
	Ploughing up,	-	0	7	6
	Planting the second time,		1	10	0
	The plants,	-	6	0	0
	Carry over,	-	14	6	6

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	Brought over,	£.14	6
	Three hand-hoeings,	1	10
	Digging in autumn,	0	10
1767.	Two hand-hoeings, -	1	0
1768.	Ditto, - -	1	0
	Taking up, all expences included, -	7	0
	Drying, at 3 <i>s.</i> per <i>C. wt.</i>	1	16
	Three years rent, tythe and town charges, at 22 <i>s.</i> - -	3	6
	Total, - -	30	8

*Produce.*

12 <i>C. wt.</i> of madder, at			
4 <i>l.</i> 10 <i>s.</i> - -	54	0	
Expences, -	30	8	
Clear profit, -	23	11	
Or <i>per annum</i> ,	7	17	
Product of the 7 acres,	378	0	
Ditto expences,	212	19	
Ditto profit, -	165	0	
Or <i>per annum</i> ,	58	6	

*Observations.*

Near 8 *l.* expence *per* acre was here incurred by accident ; so that the profit, with better fortune, would have been above 30 *l.* an acre : and this supposition is not to be slighted, as Mr. *Arbutnot* candidly owns it to have arisen from an error in ploughing when the land was too wet. However, to take the fact as it really happened, the profit is very considerable : 7 *l.* 17 *s.* 2 *d.* *per* acre *per annum*, much exceeds what can be gained from any common husbandry : 5 quarters *per* acre of wheat gained every year (which by the way is an impossibility) will not equal this amount ; at the same time that constant crops of that grain, would be without comparison more hazardous and troublesome : a strong proof of the justness of this gentleman's idea of the propriety of adopting uncommon articles of culture.

Plants were drawn from this crop, but not in abundance.

*Experiment, No. 9.*

Nine other acres of the same soil were ploughed 14 inches deep at *Michaelmas*

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1765, and dunged with 10 loads an acre of yard dung; covered by landing up.

1766.

In the spring it was planted with spring plants, dibbled in rows 2 feet asunder, by 18 inches from plant to plant; and kept clean through the summer by three hand hoeings: and in autumn the furrows were dug, and the earth thrown over the plants.

1767.

This year it was kept clean by two hand hoeings.

1768.

In *February*, a large compost, consisting of farm-yard dung and some ashes, laid on the headland and mixed well with a large quantity of virgin earth, was spread on the land, and in the summer it was hand-hoed twice. In autumn it was ploughed up, to the depth of 18 inches; and the crop which was dry amounted to 12 *C. wt. per acre*, at 4s. 10s.—But three lands, of 3 rows each, were left for a further growth of three years longer, by way of experiment, to discover the increase of the root in standing three years extraordinary.

*Expences.*

1765.	Ploughing,	-	£.1	4	0
	Manuring,	-	3	10	0
	Landing up,	-	0	7	6
766.	Spring earth,	-	0	7	6
	Planting,	-	1	0	0
	Three hand-hoeings	-	1	10	0
	Autumnal digging,	-	0	10	0
767.	Two hand-hoeings,	-	1	0	0
768.	Manuring,	-	4	0	0
	Two hand-hoeings,		1	0	0
	Digging up,	-	7	0	0
	Drying, at 3s. a C. wt.		1	16	0
	Three years rent, &c.		3	6	0
			<hr/>		
			26	11	0
			<hr/>		

*Produce.*

12 C. wt. of madder, at					
4l. 10s.	-	54	0	0	
Expences,	-	26	11	0	
		<hr/>			
Clear profit,	-	27	9	0	
		<hr/>			
Or per annum,		9	3	0	
		<hr/>			

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Product of the nine

acres, - -	486	0	0
Ditto expences,	238	19	0
Ditto profit, -	245	1	0
Or <i>per annum</i> ,	81	13	0

*Observations.*

It is to be remarked on this crop, that the produce does not exceed that of Experiment, No. 8, notwithstanding the last year's manuring at the expence of 4*l.* an acre; it is true that the first planting it succeeded, which might perhaps be a matter of consequence in gaining time before the summer heats came on; notwithstanding however to the amount of balancing a manuring of 4*l.*: it should therefore seem that the manure ought to be spread on the land before planting, or at least long before the last year of the crop, for then the plants have not time to avail themselves fully of the advantage. The plants, Mr. *Arbutnot* remarks, on this crop were too far advanced, and the last dunging did not answer; as by earthing, it drew up shoots, that shewed the appearance of great increase, when the crop was taken up; but the tops being more succulent than the other



part of the root, they withered in proportion to their succulency.

The profit is very considerable: 9*l.* 3*s.* *per* acre clear, is such a degree of advantage as can never be expected in any common husbandry: make it as perfect as you please, it will never arrive at such a height.

*Experiment, No. 10.*

In 1766, nine acres were fallowed, receiving in all six earths: the first, 14 inches deep, and landed up in autumn by the last, being at the same time thrown on to 4 feet ridges.

1767.

In the spring it was manured at the rate of 5 sacks *per* acre of wood-ashes, and 5 quarters *per* acre of trotters; and the whole covered by reversing the ridges. It was then planted with dibbles: 6 acres, one row on a land; 2  $\frac{1}{2}$  acres, two rows on a land; and  $\frac{1}{2}$  an acre, one row on 2 feet lands. These variations were made by way of trial, to discover the most profitable method of planting. The sets in each, one foot asunder.

This summer the rows were hand-hoed three times; and many hard clods being

tumbled, by the first hoeing, into the furrows, they were crushed in pieces by a small spiky roller; an implement used by Mr. *Arbutnot*. The intervals were horse-hoed thrice with a shim, which cuts the land and weeds, but does not bury them. After each shimming, followed another implement; the double mould-board plough with moveable earth-boards expanding at pleasure: this machine strikes the loose earth from the furrows, which was raised by the shim earthing up the beds. These operations were the same to all, except the half acre planted on narrow lands, which could only be hand-hoed. In autumn the furrows were again struck with the double mould-board plough.

1768.

This year the beds were hand-hoed thrice, and the furrows shimmied three times; followed each time, as before, with the double mould-board plough. On the last hand-hoeing, two acres were sown with weld, as the madder plants stood thin on these acres. The furrows in autumn struck,

as before, with the double mould-board plough.

1769.

This year the rows were hand-hoed twice; and the furrows ploughed with the him and double mould-board plough thrice; but none of these operations to the two acres where the weld was sown. In *July* the weld was pulled; and in *October* the madder taken up with the great plough; laying two lands into one.

The products were as follow.

No. 1. On the half acre, single rows on 2 feet lands, 6 *C. wt.*

No. 2. On the six acres, single rows on 4 feet lands, 8 *C. wt. per acre.*

No. 3. On the  $2\frac{1}{2}$  acres, double rows on 4 feet, 10 *C. wt. per acre*, and 72 *l.'s* \* worth of weld on the two acres—but the half acre, where no weld grew, was the best part.

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\* *N. B.* Weld was this year 12 *l.* a load.

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*Account of No. 1.*

Proportions *per acre.*

*Expences.*

1766.	Five ploughings, at			
	7s. 6d.	-	£.1	17
	One deep ditto,	-	0	17
1767.	Five quarters of trotters,		3	0
	Five facks of wood ashes,		0	12
	Ploughing,	- -	0	7
	Planting,	- -	1	5
	Three hand-hoeings,	-	1	10
	Striking furrows,	-	0	1
1768.	Three hand-hoeings,	-	1	10
	Striking furrows,	-	0	1
1769.	Two hand-hoeings,	-	1	0
	Taking up the madder,		5	10
	Drying, at 3s.	-	1	16
	Rent, tythe, and town			
	charges, four years,		4	8
			<hr/>	
			23	15
			<hr/>	

*Produce.*

12 C. wt.,	at 4l. 10s.		54	0
Expences,	-		23	15
			<hr/>	
Clear profit,	-		30	4
			<hr/>	

THROUGH ENGLAND. 281.

*Account of No. 2.*

*Expences.*

1766.	Five earths, at 7s. 6d.	£.1	17	6
	One deep ditto, -	0	17	0
1767.	Trotters and ashes, -	3	12	6
	Ploughing, - -	0	7	6
	Planting, - -	1	0	0
	Three hand-hoeings, -	1	10	0
	Rolling furrows with spi-			
	ky roller, -	0	0	8
	Horfe-hoeing with shim			
	thrice, at 8d. -	0	2	0
	Ditto double mould-board			
	plough, four times, at			
	1s. 2d. -	0	4	8
1768.	Three hand-hoeings -	1	10	0
	Shimming thrice, -	0	2	0
	Double mould board			
	plough, four times,	0	4	8
1769.	Two hand-hoeings, -	1	0	0
	Shim thrice, -	0	2	0
	Double mould-board			
	plough, - -	0	4	8
	Taking up, -	5	10	0
	Drying, at 3s. -	1	4	0
	Four years rent, &c.	4	8	0
		<hr/>		
		23	17	2

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*Produce.*

8 C. wt. at 4 <i>l.</i> 10 <i>s.</i>	£.36	0	0
Expences, -	23	17	2
Clear profit,	12	2	10

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*Account of No. 3.*

*Expences.*

1766.	Ploughing as before, -	2	14	6
1767.	Trotters and ashes, -	3	12	6
	Ploughing, - -	0	7	6
	Planting, - -	1	5	0
	Hand-hoeing, and horse- hoeing as in No. 2.	1	17	4
1768.	Ditto, - - -	1	16	8
	Weld, seed and sowing,	0	1	6
1769.	Pulling, &c. the weld,	1	10	0
	Taking up the madder,	5	10	0
	Drying, at 3 <i>s.</i> -	1	10	0
	Four years rent, &c.	4	8	0
		24	13	0

---

*Produce.*

10 C. wt. Madder, at 4 <i>l.</i>			
10 <i>s.</i> - -	45	0	0
Weld, - -	36	0	0
	81	0	0
Expences, -	24	13	0
Clear profit, -	56	7	0

---

# THROUGH ENGLAND. 283

Supposing the weld not sown, the account would be;

Madder,	-	-	£.45	0	0
Expences,	-		23	1	6
Clear profit,	-		21	18	6

## *Comparison.*

Single rows on 2 feet lands,	30	4	2
Double rows on 4 feet lands,	21	18	6

Superiority of the former,	8	5	8

Single rows on 2 feet lands,	30	4	2
Single rows on 4 feet lands,	12	2	10

Superiority of the former,	18	1	4

Double rows on 4 feet lands,	21	18	6
Single rows on ditto,	12	2	10

Superiority,	9	15	8

Profit *per acre per annum* on the  
single rows on 2 feet, - 7 11 0½

Ditto on the double rows at  
4 feet, - - 5 9 7½

Ditto on the single rows at 4 feet, 3 0 8½

Ditto on the madder and weld, 14 1 9

*Total of the nine acres.**Expences.*

Half an acre of No. 1.	-	11	17	11
Six acres of No. 2.	-	143	3	0
Half an acre of No. 3 without weld,	- - -	11	10	9
Two acres of ditto with weld,		49	6	0
		<hr/>		
		215	17	8
		<hr/>		

*Produce.*

No. 1. Half an acre,	-	27	0	0
No. 2. Six acres,	-	216	0	0
No. 3. Half an acre,	-	22	10	0
Ditto two acres,	- -	162	0	0
		<hr/>		
		427	10	0
Expences,	-	215	17	8
		<hr/>		
Clear profit,	-	211	12	4
		<hr/>		
Which is, on an average, <i>per</i> acre,	- - -	23	10	3
		<hr/>		
And <i>per acre per ann.</i>	-	5	17	6
		<hr/>		

*Observations.*

The great profit in this experiment is by the sowing weld on the madder; but in  
con



considering the culture of the latter plant, this circumstance should be thrown out of the account; the madder was however damaged by it, and the weld would have been as good a crop had no madder been on the ground, and probably a better. But a product by weld of 36*l.* an acre, for only 2 years, (supposing a fallow) and the culture not expensive, appears to be an object of capital importance: Probably not many madder crops will pay better.

In the comparison between the modes of culture, something should be allowed to No. 3. on account of the damage arising from the weld.

It is extremely evident, that the nearer the rows, the greater the crop—at least to the proximity of 2 feet equally distant. Single rows at 4 feet, are not half so advantageous, which is very remarkable. Two rows on 4 feet are almost doubly more beneficial than the single ones; but though two rows on a 4 feet land amount in the whole to the same as equally distant at 2 feet, yet do they not near equal them in product; from which it should seem that the plants should be spread pretty equally

over the land. If madder is observed in the taking up, it will be found that the principal produce is the large roots which shoot immediately from the crown; take a cubical foot of land surrounding one plant, there will be much more crop in that space, than in half as much again, or perhaps double the space next adjoining; which seems to account for rows equally distant 2 feet, being better than 2 on 4 feet. How much of the superiority is to be attributed to the horse-hoeing on both sides the rows, cannot be decided from this trial.

The profit clear of 7*l.* 11*s.* 0*d.*  $\frac{1}{2}$  *per acre per ann.* on the best crop, is extremely advantageous, and much exceeding the gross *product* of the best common husbandry. The same observation is almost as applicable to the 5*l.* 9*s.* of the double rows. But the 3*l.* *per acre* on the single rows may be exceeded by common crops.

The profit of the weld and madder, 14*l.* an acre, is great; and certainly demands the attention of all who may have crops in the same situation, more particularly as it has been the general opinion that such land was not proper for that vegetable.

*Experiment, No. 11.*

Four acres of an old lay were ploughed up at *Michaelmas* 1765, fourteen inches deep; the soil a deep sandy loam.

In 1766 it was fallowed; receiving four earths, the first of which was also 14 inches deep. In autumn it was landed up.

In spring 1767, manured it with 3 quarters of trotters and 75 bushels of lime *per* acre; which were turned in by ploughing down on to 4 feet lands. It was then planted with dibbles, 2 rows on each land, at one foot asunder. The whole was destroyed by the sod or wyer worm; which miscarriage was owing to its being an old lay.

*Expences.*

1765.	First ploughing,	-	£.0	17	0
1766.	Ditto.	-	0	17	0
	Three common earths,		1	2	6
	Landing up,	-	0	7	6
1767.	Trotters, 3 quarters,	-	1	13	0
	75 bushels lime, at 9 <i>d.</i>		2	16	3
	Ploughing down,	-	0	7	6
	Planting,	-	1	5	0
	Two years rent,	-	2	4	0
			<u>11</u>	<u>9</u>	<u>9</u>

The planting and the value of the sets are the only charges here to be carried to the account of madder; the tillage and manuring being so much value in the land for other crops. The field was ploughed up and sown with turnips.

This experiment should be a lasting warning against ever planting madder on new land, for most of it is full of this food worm, and it is plain that one year will not destroy them: Land should be thrown into one round of crops before the madder is planted; in that time the worm's food will be destroyed, and no danger consequently remain.

*Experiment, No. 12.*

Four acres of the same soil as No. 11 were followed through the year 1766, receiving 5 common ploughings, and one of 12 inches deep, and afterwards landed up in 4 feet ridges. In the spring of 1767 it was manured with 3 quarters of trotter and 4 sacks of wood-ashes *per* acre, and turned in by a common ploughing: it was then planted with dibbles; one row of each land, the sets one foot asunder; and the

that summer hand-hoed thrice; shimmed thrice; the furrows struck with double mould-board plough four times; and the clods broken by spiky roller once.

In 1768 it was hand-hoed thrice again; also shimmed thrice; and struck four times. In 1769 hand-hoed twice; and shimmed and struck as often, ploughed up, the crop 2 C. wt. per acre, at 4*l*.

*Expences.*

1766.	Five ploughings,	-	£.1	17	6
	One ditto 12 inches deep,	o	17	o	
	Landing up,	-	o	7	6
1767.	Manuring with trotters,				
	3 quarters,	-	1	16	o
	4 Sacks ashes,	-	o	8	o
	Ploughing,	- -	o	7	6
	Planting,	- -	1	5	o
	Three hand-hoeings,		1	10	o
	Rolling,	- -	o	o	8
	Shim thrice,	-	o	2	o
	Double mould-board				
	plough four times,		o	4	8
1768.	Three hand-hoeings,		1	10	o
	Carry over,	-	10	5	10

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	Brought over,	£. 10	5	10
	Shim thrice,	-	0	2
	Double mould-board			
	plough four times,	0	4	
1769.	Two hand-hoeings,	-	1	0
	Shim twice,	-	0	1
	Double mould-board			
	plough ditto,	-	0	2
	Taking up,	-	5	10
	Drying,	-	1	16
	Four years rent, &c.		4	8
			<hr/>	<hr/>
			23	10

*Product.*

	12 C. wt. at 4l.	-	48	0
	Expences,	-	23	10
			<hr/>	<hr/>
	Clear profit,	-	24	9
			<hr/>	<hr/>
	Or per acre per ann.		6	2

	Product of the 4 acres		192	0
	Ditto expences,		94	0
			<hr/>	<hr/>
	Profit,	-	97	19

*Observations.*

If the remark made in Experiment, N. 11. be justly founded, this field was plant

in a disadvantageous manner; and yet we find it produce a crop sufficient, at a low price, to pay more than 6*l.* an acre clear profit, which I need not remark is more than common husbandry can yield: It appears therefore very plainly from every view we can take of madder, that it much exceeds the farmer's culture.

*Experiment, No. 13.*

Six acres of deep black loam were trenched ploughed from lucerne in *March* 1767, with *Ducket's* trenching plough, 14 inches deep, and on that ploughing planted with madder in equally distant rows, 4 feet sunder. It was that summer hand-hoed thrice; the intervals ploughed with the slim and double mould-board plough thrice; and in autumn the furrows were struck with that implement, and the rows earthed with hand-hoes.

1768.

In this spring plants were drawn from it four times. It was in summer hand-hoed four times; horse-hoed as before, thrice; and the furrows struck in autumn.

This ground was destined for a nursery,

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being of loose texture, admitting the plants to be easily drawn, which in stronger land is very troublesome and prejudicial to the crop, as many break off short, and the roots subject to be much injured by the instrument which must necessarily be used in such land for taking up the plants.

1769.

Plants were again taken from it the spring as often as the last. The horse and hand-hoeing the same as before.

1770.

The crop came in course to be taken in autumn 1769, but it had received so much damage by having plants drawn from it, that Mr. *Arbutnot* determined to let it stand for drawing more from it in the spring of 1770, rather than damage another crop as well as this. It was therefore earthed up twice in the spring, and had plants drawn from it as long as the planting season lasted. In *August* taken up; crop 2 C. wt. per acre.



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*Expences.*

767.	Trench ploughing,	£.0	16	0
	Planting, - -	1	0	0
	Three hand-hoeings,	1	10	0
	Shim thrice, -	0	2	0
	Double mould-board plough thrice, -	0	3	6
	Ditto striking furrows,	0	2	6
	Earthing up, -	0	5	0
768.	Four hand-hoeings, -	2	0	0
	Shim thrice, -	0	2	0
	Double mould-board plough thrice, -	0	3	6
	Ditto striking furrows,	0	2	6
769.	The same as 1768, -	2	8	0
770.	Hand-hoeing twice,	1	0	0
	Twice earthing, -	0	10	0
	Taking up, -	4	0	0
	Four years rent, (at 1 <i>l.</i> ) tythe and town charges,	5	4	0
			<hr/>	
			19	9 0

*Produce.*

2 C. wt. at 4 <i>l.</i>	-	8	0	0
			<hr/>	
Loss,	- -	11	9	0
			<hr/>	

Which is <i>per acre per ann.</i>	£.2	17	3
On the six acres,	-	68	14 0

*Observations.*

It has been already remarked, that drawing plants injures a crop so greatly, that whenever Mr. *Arbutnot* often repeats the drawing from the same plantation, he gives up the expectation of a crop; knowing that it must be thereby ruined. The loss upon this account therefore, is no objection to the madder culture; it is the price at which all the plants drawn from six acres are purchased. What principally demands attention on this experiment, is the great expence at which plants are procured when they are drawn from a crop in the spring. Therefore, though it would not be proper to leave the whole crop to be taken up in the spring for the sake of obtaining plants yet it is adviseable to leave such a proportion of it as will supply the required quantity of plants; on an average one may reckon if the crop is good, that each stool will produce in the different drawings from 30 to 40 plants, but it is not adviseable to trust to

too many drawings, as that may carry you too far in the spring, and endanger the new plantation from the drought.

*Experiment, No. 14.*

In 1767, fallowed 10 acres of a strong oamy soil; ploughed it 4 times, 13 inches deep. In autumn manured seven acres of it with farm-yard dung, at the rate of 20 loads an acre; covered the dung by ridging the field into  $3\frac{1}{2}$  feet lands; manured the other three acres with trotters, 6 quarters per acre: and left the whole well water-furrowed for winter.

1768.

In *April*, planted one row on a land, by drawing a furrow with a *Suffolk* plough on the middle of the ridges, about 6 inches deep; spring plants were laid in the furrows by women and children; and earth drawn on them by men with broad hoes; and the furrows then struck with the double mould-board plough. The rows were hand-weeded twice; and the intervals thrice ploughed with shim and double mould-board plough; and in autumn the

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furrows struck with the same implement,  
The field was then water-furrowed.

1769.

This year the plantation was hand-hoed thrice, and the intervals ploughed four times with the shim and double mould-board. In autumn the furrows struck deep,

1770.

Hand-hoed the beds twice; shimmed the furrows twice, and each time followed it by the double mould-board plough.

Account of the seven acres,

*Expences,*

1767.	Ploughing four times,	£.2	12	0
	Manuring,	-	6	0
	Ridging up,	-	0	7
	Water-furrowing,	-	0	1
1768.	Planting,	-	0	18
	Hand-weeding twice,	-	0	12
	Shim thrice,	-	0	2
	Double mould-board ditto,	-	0	3
	Striking furrows,	-	0	2
	Water-furrowing,	-	0	1
1769.	Three hand-hoeings,	-	1	10
	Carry over,	-	12	10

# THROUGH ENGLAND. 297

	Brought over,	£.	12	10	0
	Shim four times,	-	0	2	8
	Double mould-board ditto,	0	4	8	
	Striking furrows,	-	0	2	6
	Water-furrowing,	-	0	1	0
770,	Two hand-hoeings,		1	0	0
	Shim twice,	-	0	1	4
	Double mould-board				
	plough ditto,	-	0	2	4
	Taking up,	-	4	0	0
	Drying, at 3s.	-	2	5	0
	Four years rent, (16s.)				
	tythe, &c.	-	4	8	0

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24 17 6

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### *Produce.*

	15 C. wt. at 4l.	-	60	0	0
	Expences,	-	24	17	6
	Clear profit,	-	35	2	6

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Which is *per acre per annum*,

			8	15	7
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And on the 7 acres,

			61	9	1
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Account of the three acres.

## Expences.

Every article the same as the preceding, except manuring and drying, - - - £. 5 12 6

6 Quarters an acre trotters, 3 12 0

Drying, at 3s. - - - 1 16 0

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11 0 6

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## Produce.

10 C. wt. at 4l. - - - 40 0 0

Expences, - - - 11 0 6

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Clear profit, - - - 28 19 6

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Which is *per acre per ann.* 7 4 11

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And on the 3 acres, - 21 14 0

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Profit by dunging, - 8 15 7

———— trotters, - 7 4 11

---

1 10 8

---

Weight *per acre* from dung, 15 0 0

———— from trotters, 10 0 0

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5 0 0

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## THROUGH ENGLAND. 299

Product of the ten acres,	£.	540	0	0
Expences ditto,	-	206	14	0
Profit ditto,	-	333	6	0
Which is <i>per</i> acre	-	33	6	7
And <i>per</i> acre <i>per</i> ann.		8	6	7

### *Observations.*

The great importance of applying the proper sort of dung is here apparent. Farm-yard compost, it is plain, much exceeds trotters: Top dressings of all sorts are too small in quantity, however rich, to last with effect three years; they want, especially on stiff land, the power of keeping it open, and aiding in pulverization. The profit of these crops are considerable, and prove how important this culture certainly is.

### *Experiment, No. 15.*

Three acres of the same soil as No. 14. were treated exactly in the same manner as the seven acres of that trial. Crop the same.

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### *Expences.*

Sundries as before,	-	£.24 17 6
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### *Produce.*

15 C. wt. at 4l.	-	-	60 0 0
Expences,	-	-	24 17 6
Clear profit,	-	-	35 2 6
Or per acre per ann.	-	-	8 15 7
And on the three,	=	-	26 6 9

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### *Experiment, No. 16.*

Seven acres of land planted before with madder, and registered in Experiment, No. 8. were again planted in 1769: It laid all winter in very high arched up ridges, after taking up the preceding crop. In *March* it was dunged with 25 great loads an acre of farm-yard dung, remarkably black, rich and rotten. It was then ploughed into lands; some 3 feet wide, and some 4 feet the latter were planted with two rows on each, 14 inches asunder, and 10 inches from plant to plant: on the 3 feet lands single rows at 1 foot from set to set. The

method



method followed in planting, was drawing furrows with a little plough; laying in the plants by women and children, and covering them with hand-hoes. They were hand-hoed thrice during the summer; horse-hoed with the shim four times, and with the double mould-board plough as often. As soon as the haulm spread over the beds, the two rows were thrown into one by the double mould-board plough, the wings much extended, in the way that pease are earthed; and on the narrow lands the earth thrown up to them by the same plough. Thus the beds were left till autumn; when the furrows were struck deep with the double mould-board, and the earth drawn by hoes in upon the haulm.

1770.

In the winter great quantities of chick-weed appeared on the beds; owing, as believed, to the thickness of the dunging. This was all extracted by hand in the spring. After which it was hand-hoed once more; shimmed twice; and ploughed with double mould-board as often——in which manner it is left for autumn work.

It comes in course to be taken up in autumn

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tumn 1771. It promises to be far superior to any yet planted. Expences hitherto incurred are ;

1769.	Manuring,	-	£.10	0	0
	Ploughing, with <i>Rother-</i>				
	<i>ham</i> ploughs,	-	0	5	0
	Planting,	-	0	18	0
	Three hand-hoeings,		1	10	0
	Shim four times,	-	0	2	8
	Double mould-board				
	plough ditto,	-	0	4	8
	Ditto struck the furrows				
	twice,	-	0	5	0
	Earthing,	-	0	5	0
1770.	First weeding,	-	1	10	0
	Second ditto,	-	0	10	0
	Shim twice,	-	0	1	4
	Double mould-board ditto,		0	2	4
			<hr/>		
			15	14	0
			<hr/>		

*Experiment, No. 17.*

Nine other acres of the same soil were also planted at the same time: this is the second crop of madder: the first is registred in Experiment, No. 9.—The rows, culture, expences, the same as No. 16.

*Experiment, No. 18.*

Two other acres were also planted at the same time as No. 16. they yielded pease in 1768 only podded; the land very clean; the tillage and planting the same: one half of it was manured like them, with 25 loads of rich yard dung; and the other half with 20 loads of sheep dung taken from the sheep pen.

It is on this crop very observable, that although the manuring, planting, &c. are the same with the above-mentioned 7 acres, yet is not the appearance of the crop near so good; this Mr. *Arbutnot* can attribute only to the land not having received that extraordinary good and deep tillage, which the other had done by taking up the preceding crop: a striking proof of the expediency of planting land with successive crops of madder.

*Experiment, No. 19.*

Six acres of a rich, deep, black loam, were sown with rye at *Michaelmas* 1768; but the crop failed. In *April* 1769, it was ploughed up; harrowed once; and planted by drawing furrows; double rows at 14 inches,

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inches, with intervals of 2 feet 10 inches. The following summer hand-hoed the row thrice: and horse-hoed the intervals with shim and double mould-board thrice; covering by the last operation 15 sacks an acre of rabbits dung: after which the furrows were struck deep.

1770.

This year two hand-hoeings were given and one weeding; and the intervals twice ploughed with shim and double mould-board.—

The appearance of this crop very great. The expences as follow.

1769.	Ploughing,	-	£.0	7
	Harrowing,	-	0	0
	Planting,	- -	1	0
	Three hand-hoeings,		1	10
	Shim thrice,	-	0	2
	Double mould-board ditto,		0	3
	15 Sacks rabbit dung,			
	1s. 4d.	- -	1	0
	Striking furrows,	-	0	2
1770.	Two hand-hoeings,		1	0
	One weeding,	-	0	7
	Shim twice,	-	0	1
	Double mould-board ditto,		0	2
			5	16

*Experiment, No. 20.*

The nine acres registered in Experiment, No. 10. were again planted.

The land remained, after taking up, under a winter fallow. In ploughing up the crop a quicksand was cut into, from which the water arose: this induced Mr. *Arbuthnot* to drain it very deep with covered drains: he carried ten through the field, 4 feet deep; the length was 600 rods; and the expence 30*l.*

It was dunged in the spring with 25 loads an acre of rotten yard dung, which were ploughed in, and afterwards the land cross ploughed: it was then slit down flat; rolled with the spiky roller; and with the large common one to break the small clods soft by the other. As the land was drained, it was planted flat; double rows at 14 inches, and 9 inches in the rows, with intervals of 2 feet 4 inches: executed by drawing furrows as before, laying the plants in them, and covering them with hoes. They were twice hand-hoed: skimmed twice; and the furrows twice ploughed with the double mould-board. The expences as follow.

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1770.	Draining,	-	£.3	6	8
	Manuring,	-	7	10	0
	Ploughing three times				
	with <i>Rotherham</i> ,	-	0	15	0
	Rolling with spiky roller,		0	2	0
	Ditto with large common				
	ditto,	-	0	1	6
	Planting,	-	1	0	0
	Two hand-hocings,	-	1	0	0
	Shim twice,	-	0	1	0
	Double mould-board ditto,		0	2	0
	Filling vacancies,	-	0	15	0
			<hr/>		
			14	13	1

*Experiment, No. 21.*

Four acres planted with madder in 1766 (See Experiment, No. 11.) and destroyed by the sod worm, were again planted. The turnips were fed on the ground by sheep in the spring; but finding it much baked, Mr. *Arbutnot* ordered it to be broken up with a plough with 2 coulters. It was then worked with spiky roller, and sown with barley; the stubble of which was manured with 25 large loads an acre of purchased dung; so rotten, that it appeared

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peared like black butter; it was ploughed in 12 inches deep, laying it at the same time in large round lands. In which manner it remained the winter.

1770.

In the spring, ploughed it in the gathering way, beginning in the middle, and ending in the old furrows, which deepened them for the purpose of draining: a point of consequence as the soil is springy. It turned up whole furrow; it was therefore worked with a spiky roller; and after a shower of rain harrowed, and rolled with a common roller; after which it was harrowed again: upon which operation it was planted, by drawing furrows as before. It has been horse-hoed twice with the slim, and as often with double mould-board.

### *Expences.*

169.	Manuring,	-	£.	10	10	0
	Ploughing,	-		0	17	0
	Ditto a common earth*,			0	4	6
	Spiky roller,	-		0	2	0
				—————		
	Carry over,	-		11	13	6

\* N. B. Three *Rotherham* ploughs did 4 acres in a day.

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Brought over,	£.11	13
Common harrowing,	-	0 0
Ditto rolling,	-	0 0
Planting,	- -	1 0
Shim twice,	-	0 1
Double mould-board plough ditto,	-	0 2
		<hr/>
		12 17
		<hr/>

*Experiment, No. 22.*

Two acres of land were cropped in 1766, one with potatoes, and the other with turnips; the latter was very much poached by drawing and carting them off. Both the turnips and potatoes were manured for, at the rate of 15 loads of good dung *per* acre.—The potatoe ridges were slit down, and sown with 2 loads of rabbit dung.

The turnip land ploughed up whole furrow; it was left till dry, and then run over with spiky roller and manured; half the acre with 50 bushels of lime, and the other half with 5 loads of sifted coal ashes. The whole two acres planted flat. It has been twice hand-hoed; and been hoe-hoed with shim and double mould-board plough.



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plough once. The piece has carried an indifferent appearance; but the potatoe half the best.—The expences of the Potatoe acre.

1770. Ploughing, -	£.	0	5	0
2 Loads rabbit dung,		7	0	0
Ploughing, -		0	5	0
Planting, - -		1	0	0
Two hand-hoeings, -		1	0	0
Shim once, -		0	0	8
Double mould-board ditto,		0	1	2
		9 11 10		
		9 11 10		

### Of the Turnip acre.

Ploughing, -	0	7	6
Spiky roller, -	0	2	0
50 Bushels lime, at 9d.	1	17	6
5 Loads coal ashes, -	3	0	0
Ploughing, -	0	5	0
Planting, - -	1	0	0
Hand and horse-hoeing,	1	1	10
	7 13 10		
	7 13 10		

### *Experiment, No. 23.*

One acre of good mellow loam was ploughed up in autumn 1769, being part of a mad-

der crop. The lands 8 feet broad, and 2 feet higher in the center than in the furrows; in which manner it was left till spring.

1770.

In *May*, two small furrows were turned from the beds, and the land then manured with 2 loads of rabbit dung harrowed in. It was then planted in double rows, at 14 inches, in the old furrows of the 8 feet beds. This was done with an intention to manure the large intervals, and plough them gradually to the rows; but the intervals were so high, and the weather wet, that the cart could not go on, which prevented the intended earthing of the rows; but they were twice hand-hoed; and the whole interval shimmied once. The appearance of the crop very dwindling, owing, as believed to its being planted too late,

The expences.

1770. Manuring,	-	£.7	0
Harrowing,	-	0	0
Planting,	-	0	10
Hand-hoeing,	-	0	15
Shim once,	-	0	1

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8 7

Upo

Upon this experiment it should be observed, that our very ingenious cultivator having discovered a peculiarity in the growth of madder, formed this trial to ascertain the fact in large: He observed, from an experiment made on a plant in the garden, that by earthing up the rows, the stalk was converted to the richest part of the root: this uncommon circumstance gave him the hint of planting in the furrows, instead of on the tops of the ridges, with intention of forming the ridge into a rich compost, and turn it gradually to the rows, until the furrows came to be situated in the center of the old ridges, and the rows growing out of new ones—in a word, to plant and cultivate madder in the common method of managing celery. The thought is a beautiful one; how far it will answer in practice, experience can alone determine: the only objection that appears at first view is, the doubt whether the rows will spread sufficiently to fill such large spaces: but this concerns only wide intervals; it may be found proper to adopt this new method in furrows of two or three feet lands, as well as those of 8 feet ones. It

must depend greatly on the fertility of the soil ploughed down to the rows; for as the whole depends on a vast luxuriant strength of shoots, it must be absolutely necessary to force them as much as possible. If madder was planted, literally speaking, in a dung-hill, this method appears to be the most eligible; and it will probably be found *comparatively* successful, in exact proportion to the richness of the land.

*Experiment, No. 24.*

Four acres of light sandy loam were cropped with barley in 1769; and the stubble being ploughed up directly after harvest, cabbages were planted on it; which were fed on the land, in the spring, by sheep. it was then ploughed into broad lands with deep furrows for draining it; this ploughing was not more than eight inches deep, the earth for the cabbages being at least 12 deep. It was then spiky rolled and planted.

One acre was folded, and the rest manured with rabbit dung, about 70 sacks an acre, harrowed in. The planting was performed as before, by drawing furrows. They have been twice hand-hoed; and  
horse

horfe-hoed once more with shim and double mould-board plough.

The appearance of the plants very good, except in the lower part of the field, which is wet.

*Expences.*

1770.	Ploughing,	-	£.0	7	6
	Spiky rolling,	-	0	2	0
	Rabbits dung,	-	4	4	0
	Planting,	-	1	0	0
	Hand-hoeing twice,	-	1	0	0
	Shim,	-	0	0	8
	Double mould-board,		0	1	2
			<hr/>		
			6	15	4
			<hr/>		

*Experiment, No. 25.*

Seven acres of a dark rich mould on brick earth, were manured with 25 loads an acre of purchased dung, that had laid three years without turning; quite black butter. It was ploughed in 14 inches deep in broad lands with great wheel plough; the furrows left deep. Mr. *Arbutnot* remarked that the worms worked the dung quite through all the furrows; from whence he justly concludes

concludes that there is no danger of burying dung; an idea common among the farmers.

On dissecting many of the tubes made by the worms, he found them from top to bottom full of solid dung; from whence it is evident, that they mix the dung more immediately with the soil than could be performed by any tool.

1770.

In the spring of this year the lands were sowed up by a gathering earth, and harrowed and rolled; also ox-harrowed. Planted in double rows, 14 inches asunder on 4 feet lands. They have been hand-weeded twice; and ploughed with thin and double mould-board plough twice.

The appearance of the crop is remarkably great.

The expences.

1769.	Manuring,	-	£. 10	10	0
	Ploughing,	-	0	14	0
1770.	Gathering,	-	0	5	0
	Harrowing twice,	-	0	1	0
	Rolling,	-	0	0	0
	Harrowing,	-	0	1	0
	Carry over,	-	11	11	0

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Brought over,		£.	11	11	6
Planting, - -			1	0	0
Hand-hoeing, - -			1	0	0
Shim, - - -			0	1	4
Double mould-board plough, - - -			0	2	4
			13 15 2		
			13 15 2		

### *Experiment, No. 26.*

Five acres of a deep, black, rich, loamy soil were cropped with turnips in 1769, the crop eaten on the land by sheep; ploughed early in the spring: It was then manured with 8 loads an acre of night soil from *London*, which were ploughed in, and the land harrowed flat; upon this harrowing the sets were planted as in the preceding trials. The crop has been once hand-hoed; once weeded; and horse-hoed twice with double mould-board plough, which earths up the plants, and once with the shim. The appearance of the crop very great.

### *Expences.*

1770,	First ploughing, -		£.	5	0
	8 Loads, at 11s. -			4	8 0
				4 13 0	
	Carry over, -			4	13 0
				1	

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Brought over,	£.4	13	0
Second earth,	-	0	5
Harrowing,	-	0	1
Planting,	-	1	0
Hand-hoeing,	-	0	10
Weeding,	-	0	6
Shim,	-	0	0
Double mould-board,		0	2
		<hr/>	<hr/>
		6	18
		<hr/>	<hr/>

*Experiment, No. 27.*

In 1766, Mr. *Arbutnot* set one plant of madder in his garden. A hole was dug of 3 feet diameter, and filled with the rotten mould of a melon bed; as it grew it was regularly earthed up with the same mould, the vines of the plant being spread, and the earth laid on them, leaving out the points; continued this earthing during that year, and in autumn covered the whole with the melon mould. The two following years the same management was observed in every respect. In autumn 1768, dug it up; the plants and roots were washed clean and drained from water; the weight green, 42 *lb.*; dried ready for grinding, it weighed



weighed  $7 \frac{1}{4}$  lb.; the dry weight, therefore, is rather better than a sixth of that green.

He has also another plant, now growing, which was set the same day, and treated in the same manner on a black soil near the surface of water, to determine how far it will prejudice the root.

### *Observations.*

A single plant of madder coming in three years to  $7 \frac{1}{4}$  lb. is a most extraordinary growth. But it is observable that this plant did not diminish above 6-7ths, whereas the general run of plants diminish 7-8ths. This must be attributed to the solidity of the plant from its extraordinary size. This evidently shews that ground cannot be made too rich. And though the treatment was not such as could be imitated in a field, yet it should be considered as a lesson to madder planters, never to fear excessive richness of soil or manure: it is evident that no manuring is too much for this vegetable; and in all probability this fact will be found so extensively true, that it may answer to contract the attention and  
 expence

expence of ten acres to a single one. Suppose an acre planted in the same manner as in the above experiment, there would be 4840 plants, which at  $7\frac{1}{4}$  lb. amount to 15 tons 13 C. wt. and at 4l. 10s. per C. wt. to 1408l. If you cover an acre a yard deep with dung or rotten compost, it will take 4840 loads, of 30 bushels each, which may be called 3500 farmers loads, and at 8s. come to 1400l. It is clear the experiment on an acre of land would be a losing one; but it is at the same time astonishing to think how near the first crop would come towards paying such an immense expence. But suppose the land, in the taking up such a crop, to be dug 4 feet deep from the surface, 1 foot of the old mould would then be mixed with the new addition of 3 feet, and on this a new plantation of madder for three years more; the probability of a vast profit would then be great—and the land would for ever bear the richest crops.

### GENERAL OBSERVATIONS.

The culture of this valuable plant has been so great a novelty in *England*, that not one farmer in five hundred knows that such  
a vege-

a vegetable exists; even the endeavours, spirited as they have been, of a very patriotic society, have not done much in extending the culture through this kingdom: a premium of 5*l.* per acre on all planted, was a measure that seemed to insure success, and to promise us the lasting benefit of raising us much of this dye as our manufactures require. But this appearance has been somewhat deceitful: very many claimants for the premium have discontinued the culture from its proving disadvantageous; and the general idea has been, that we cannot rival the *Dutch* in this branch of agriculture. The failures that have happened, probably have arisen from a want of knowledge in the nature of the plant, and the proper method of treating it—and doubtless much mischief was done by an elaborate publication under a celebrated name, which interdicted the use of dung. But to whatever cause it has been owing, certain it is that this branch of cultivation has made no progress: the Society's premiums raised a temporary pursuit, which has of late subsided, and left this important article in a fair way to as total a neglect as ever

ever it was in through the first half of the present century.

In this situation there was little hope of reviving the attention of the public to madder, unless some very spirited experiments were made, which should prove how far the culture is beneficial—what soil is proper for it—and what treatment requisite in planting, cleaning, &c. Reports concerning it were so vague, that no dependance could be placed in them; nothing could be listened to but real proof—and not only *real*, but *disinterested* proof; for persons interested in the *trade* of madder, had promised such mountains of profit, that every assertion began to be suspected; until many people treated the idea of it as a profitable article of *English* culture, as a chimera.

In this critical juncture Mr. *Arbutnot* gave his attention to cultivating madder and from the moment he began, has prosecuted it with a spirit that does honour, not to himself alone, but I will venture to add even TO HIS COUNTRY. The unremitting attention which he has given to every minutæ of the culture, and the steady perseverance with which he has attacked every difficulty

difficulty as it arose; have been nobly calculated for commanding success.

He has shewn the world that madder may be profitably cultivated on soils not of extraordinary natural fertility—that thorough good husbandry, with rich manuring, will prove sufficient; consequently, that our madder culture need not be confined to pots unusually rich, but extended over most parts of the kingdom, except on very poor, stoney, or clayey soils.

The patriotic ideas of a private individual so spiritedly exerted; deserves the utmost commendation; but the testimony of many hundred persons to whom this gentleman has shewn and explained (with the utmost freedom and candour) all his experiments; renders any eulogy unnecessary.

It should be observed, that the preceding experiments, which are complete, include only the beginning of his culture; many variations are made, not from experience having proved them right, (for there has not been time for the completion of such) but to discover from the event the most advantageous. They include several trials which suffered from a want of that know-

ledge which he now possesses; and I should further add, that none of them nearly equalled, in appearance, most of his crops at present on the ground.

By throwing the particulars into one view, a clearer idea will be formed of them.

Experiment, No. 7. The first

crop, loss on one acre,	£.31	9	0
No. 13. Ditto on 6 acres,	68	14	0
	<u>100</u>	<u>3</u>	<u>0</u>

This sum being the amount of loss in the preceding trials, is the price of the plants when not purchased; when they were bought, the amount is charged in the respective account. 98 Acres have been planted; it may therefore be called 20s. an acre, as there is no probability of the crop on the ground turning out unprofitable. The sum of 20s. an acre is therefore to be deducted from each crop.

Experiment, No.

8. Profit on

7 acres,	£.165	0	6
Deduct for plants,	7	0	0
	<u>158</u>	<u>0</u>	<u>6</u>

No. 9. Profit on

9 acres,	-	245	1	0
Deduct,	-	9	0	0
		<u>236</u>	<u>1</u>	<u>0</u>

Profit on 17 acres in 3 years, 394 1 0

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No. 10. Half an

acre, - £. 15 2 1  
 Six acres, - 72 17 0  
 Two and half ditto, 54 16 3

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142 15 4

Deduct, 9 0 0

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133 15 4

No. 12. Profit on

4 acres, - 97 19 4  
 Deduct, - 4 0 0

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93 19 4

No. 14. Profit on

7 acres, - 245 17 6  
 Deduct, - 7 0 0

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238 17 6

No. 14. Profit on

3 acres, - 86 18 6  
 Deduct, - 3 0 0

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83 18 6

No. 15. Profit on

3 acres, - 105 7 6  
 Deduct, - 3 0 0

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102 7 6

Profit on 26 acres in 4 years, 652 18 2

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Which is *per* acre, - - 25 2 2

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and *per annum*, - 6 5 6

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394 l. 1s. 6d. on 17 acres, in			
3 years, are <i>per</i> acre,	£.23	3	0
And <i>per annum</i> , - - -	7	14	4
Ditto on the 4 years, - -	6	5	6
Superiority, - - -	1	8	10

I need not here be particular in observing, that the profit made by an application of the land during three-years, being superior to that of four, is a circumstance decisive in favour of the shorter time, as the land, it is to be supposed, might have been applied in the extra year to other advantage: the profit of three years equaling four, shews that the ground, in the latter, was in a state that required the previous fallow, and which it must have had for any other crop.

It should here be observed, that Mr *Arbutnot* is clearly of opinion, that no crop requires *cleaner* ground, from the great difficulty of extracting root-weed from among the fibres of the plants, which consequently would, in three years, get entire possession of the ground.

The average profit *per* acre *per ann.* 0



all the crops taken up, amounting to above 7*l.* 7*s.* is, upon the whole, a degree of advantage, that speaks greatly in favour of the culture. It is in itself very considerable, and much exceeds any thing that common husbandry can execute; but there are attendant circumstances, which should, on no account, be overlooked: this average is drawn from the first crops raised. Mr. *Arbutnot* had no guides to follow, but such as led him much astray: he found no directions in books, but such as lost him considerable sums of money. Under these disadvantages, with that universally acting one, the want of experience, it is astonishing, that the crops here minuted should turn out profitable on the whole, and is, I think, a much greater proof of the advantages of the culture, than much superior success hereafter may turn out. If the difficulties attending new undertakings be considered, this will not be thought an extravagant idea: Notwithstanding these unfavourable circumstances, yet, had the soil been naturally rich, such as old hop-grounds for instance, the profit would certainly have been considerably greater, probably double.

A clear profit of 7*l.* 7*s.* *per acre per annum*, on a plant, whose culture ameliorates and cleans the soil in a great degree, deserves no slight attention. It will be difficult to find a well-managed farm that pays 40*s.* an acre clear profit; but these beginnings in the madder culture return more than thrice as much. It must be the very perfection of common husbandry to pay two or three pounds *per acre*; but madder does it even under very unfavourable circumstances, unavoidable at first setting out: the one cleans the land, the other fills it with weeds. All these crops receive 20*s.* *per acre per ann.* in hand-hoeing alone, besides numerous horse-hoeings! And the extraordinary tillage the ground receives, by taking up the roots, is such as no other husbandry will admit of, except the similar culture of licquorice. It is known about *Pomfret*, that, by this tillage, they are able to repeat the same crop *ad infinitum*: a practice, which, Mr. *Arbutnot* is very clear, may be pursued in madder; which, indeed, is confirmed by experiment, No. 8 and 16. Nor is it to be believed, that this plant, notwithstanding the great luxuriance  
of

of the growth, can impoverish the land, as it is well known, that all green smothering crops, to which this is similar, are great improvers, provided they are not suffered to perfect their seed, which madder rarely does in this country. The crops now on the ground look, beyond all comparison, better than those which have been taken up; from which it is extremely evident, that the products will be vastly larger, although the expences are encreased but little. Upon the whole, the advantages of madder are so great, that no person need to fear a vast profit, if he possesses the proper soil, and will follow the improved practice of this gentleman.

These experiments are not only very considerable in their extent, but the conclusions to be drawn from them are uncommonly important; for we not only find what practice is best, but we also discover *why* it is best, from the experience of contrary measures.

The importance of very rich manuring, and the great mischief done to the crops by drawing plants from them, are points that have hitherto been totally unknown, but are here proved in the clearest manner.

It should be observed, that Mr. *Arbutnot* has constantly found the roots of madder to bear exact proportion to the luxuriance of the branches and leaves: a circumstance, which is not allowed to be the case by some, who have written on the subject.

From a conversation he has had with Mr. *Crowe* of *Feversham*, he is determined once more to try winter plants, as the uncertainty of the season, when spring plants can only be put into the ground, renders that practice very hazardous.

#### IV. EXPERIMENTS IN THE DRILL CULTURE OF SEVERAL CROPS.

There is not a part of agriculture, which has been more the subject of diversity of opinion, than the comparative merit of the old and new husbandry. Every experimenter has tried the practice of drilling; almost every one has given a different idea of it; yet, in such variety, we have not hitherto met with any regular series of trials, that have indisputably decided the degree of advantage to be attributed to it. The very ingenious and accurate cultivator,

whose experiments I have now the satisfaction of laying before the public, has not overlooked this part of husbandry; but has formed a variety of trials, upon a very different plan from any yet known.

Wheat, cultivated in this manner, is the object in general most attended to; it will be necessary here to unite it with beans, as some of the chief of Mr. *Arbutnot's* experiments in drilling wheat, are in succession with drilled beans.

*Experiment, No. 28.*

*Culture, expences, and produce, of eight acres of drilled beans,*

1767.

*Culture.*

The soil of this field is a strong, dark-coloured loam, tending to clay, on a clay bottom. In 1766, it yielded wheat, the stubble of which was very foul with numerous weeds. It was ploughed once in the spring, and on that earth dibbled with beans, part tick, and part horse-beans: of the first  $2\frac{1}{2}$  bushels *per acre*; of the latter 2 bushels: the rows equally distant, 16 inches asunder: they were hand-hoed twice; the crops  $3\frac{1}{2}$  quarters *per acre*.

*Expences*

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### *Expences per acre.*

One ploughing,	-	-	£. 0	10	0
Seed,	-	-	0	8	0
Dibling,	-	-	0	6	0
Two hand-hoeings,	-	-	0	12	0
Reaping,	-	-	0	7	0
Harvesting,	-	-	0	5	0
Thrashing, 3 $\frac{1}{2}$ quarters,	-	-	0	4	6
Carrying ditto out,	-	-	0	5	0
Rent, &c. &c.	-	-	1	2	0
Total,	-	-	3	19	6

### *Produce.*

Three quarters and a half,* at 26s.	4	11	0
Straw,	-	-	1 10 0
			6 1 0
Expences,	£	-	3 19 6
Clear Profit,	£	-	2 1 6
And on the 8 acres,	-	-	16 12 0

Near two guineas an acre profit on a crop, that is to be considered as a preparative for corn, and a substitute for a fallow, is very considerable. It is a strong proof, that

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\* N. B. The measure is nine gallons for this and all the ensuing experiments.

that drilled beans, even on a single ploughing, may be depended on for cleaning a foul piece of land, and, at the same time, yielding a very beneficial produce.

*Experiment, No. 29.*

*Culture, expences, and produce, of eight acres of drilled wheat.*

1768.

*Culture.*

The bean stubble of the preceding experiment was ploughed directly after harvest, throwing down the lands. The field was then cross ploughed with little *Suffolk* wing ploughs. Five of them did the 3 acres in a day; after which it was ridged up again: the ridges two bouts and,  $3\frac{1}{2}$  feet over. They were harrowed once and drilled; two rows of wheat on each, at ten inches asunder: the quantity of seed three pecks *per* acre. After the drilling, the furrows were struck with the double mould-board plough, and the land left well water-furrowed. In the spring, ten sacks an acre of malt-dust were sown on the corn; the ten-inch partition was once horse-hoed with the shim, and the intervals five times with the same instrument, being followed each time by the double

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double mould-board plough. The last horse-hoeing was after the blossoming of the corn, the horses being muzzled: the rows were once hand hoed with five-inch hoes. The product 4 quarters *per* acre.

*Expences.*

1768.	First ploughing,	-	£.0	8	6
	Second ditto,	-	0	4	6
	Third ditto,	-	0	4	6
	Harrowing,	-	0	0	6
	Three pecks of feed,		0	5	0
	Drilling,	-	0	1	6
	Striking furrows,	-	0	1	2
	Water-furrowing,	-	0	1	0
	Two sacks of malt-duft,				
	at 1s. 4d.	-	1	6	8
	Shim six times,	-	0	4	0
	Double mould-board, 5 dit.		0	5	10
	Once hand-hoeing,		0	4	0
	Reaping,	-	0	8	0
	This is a great price; but the men would not do it for less, on account of its being sprawled about.				
	Harvesting,	-	0	3	0
	Thrashing and binding				
	the straw,	-	0	13	0
	Carrying out,	-	0	2	0
	Rent, &c. &c.	-	1	2	0
	Total,	-	5	15	8



# THROUGH ENGLAND. 333

## *Produce.*

4 Quarters, at 52s. 6d.	£. 10	10	0
1 $\frac{1}{2}$ Load straw,	-	1	10 0
		<hr/>	
		12	0 0
Expences,	-	5	15 8
		<hr/>	
Clear profit,	-	6	4 4
		<hr/>	
And on the 8 acres,		49	14 8
		<hr/>	

## *Observations.*

This crop reflects no slight honour on the drill culture of wheat; and much exceeds what is conceived of it in nine tenths of the kingdom. The profit of more than 6*l.* per acre is not the only object; the hoeings, amounting to thirteen operations, could not fail being of great service to the land, both in ameliorating and cleaning it. The efficacy of such means of cleaning can never be doubted: for here was a wheat stubble taken out of the hands of a wretched farmer, as foul as possible; by one hoeing crop of beans it is prepared for wheat; that wheat kept as clean as a garden, and yet pays 6*l.* an acre profit: In product, many broadcast crops exceed it, but then the land is left in a very different state.

It will not be improper to remark, that this mode of drilling leaves an interval of 2 feet 8 inches wide, which is much narrower than the space recommended by *Tull*, and so regularly persisted in by *M. de Chateauxvieux*. It is evident that such a space is sufficient for every purpose of keeping the land clean. The horse-hoeing in the 10 inch partition was with a small share in the shim on purpose for such a breadth.

*Experiment, No. 30.*

*Culture, expences, and produce of eight acres of drilled beans.*

1769.

*Culture.*

The wheat stubble of the last experiment was ploughed up the beginning of *December*; the ridges on which the wheat grew being reversed: they were then drilled with beans, double rows on each, at 14 inches; consequently the intervals were 2 feet 4 inches. The seed, 2 bushels an acre. Five acres were the mazagan sort, and three the tick. The culture bestowed on them while growing, consisted of two hand-hoeings, and six horse-hoeings; three with the shim, and as many with the double mould

mould-board plough. The product was 3 quarters per acre.

*Account of the mezagan.*

*Expences.*

769.	Ploughing,	-	£.0	4	6
	Harrowing,	-	0	0	6
	Drilling,	- -	0	1	6
	Seed,	- -	0	10	0
	Striking furrows,	-	0	1	2
	Water-furrowing,	-	0	1	0
	Two hand-hoeings,	-	0	10	0
	Shim thrice,	-	0	2	0
	Double mould-board ditto,		0	3	6
	Reaping,	- -	0	8	0
	Harvesting,	- -	0	3	0
	Thrashing 3 quarters,				
	1s. 2d.	- -	0	3	6
	Rent, &c.	- -	1	2	0
			<u>3</u>	<u>10</u>	<u>8</u>

*Produce.*

	3 Quarters beans, at 40s.	6	0	0
	Straw,	0	10	0
		<u>6</u>	<u>10</u>	<u>0</u>
	Expences,	3	10	8
	Profit,	<u>2</u>	<u>19</u>	<u>4</u>
	On the 5 acres,	<u>14</u>	<u>16</u>	<u>8</u>

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*Account of the ticks.**Expences.*

As above, except feed, -	3	0	8
Seed, 2 bushels, at 3s. 6d.	0	7	0
	<hr/>		
	3	7	8

*Produce.*

3 Quarters, at 28s. -	4	4	0
Straw, - - - - -	1	0	0
	<hr/>		
	5	4	0
Expences, - - - - -	3	7	8
	<hr/>		
Profit, - - - - -	1	16	0
	<hr/>		
On the three acres, -	5	9	0
Ditto the five, - - -	14	16	8
	<hr/>		
Total, - - - - -	20	5	8
	<hr/>		
Average, - - - - -	2	10	8

*Observations.*

The difference in the profit between the two forts is great, and shews how much, in many cases, depends on chusing the fort or feed with judgment. Mr. *Arbuthnot* has remarked, that the great advantage of the mazagan bean, is its being harvested a month before the tick, and six weeks before

fore the common horse-bean; which in many instances is a most valuable circumstance: and if a person chuses to sow turnips among his beans, to be covered by the last hoeing, this sort, by coming off so early, must suit much the best. The meal is far whiter, and the bean fuller of than any other sort.

*Experiment, No. 31.*

*Culture, expences, and produce of eight acres of drilled wheat.*

1770.

*Culture.*

The same field. The bean ridges ploughed down directly after harvest, and then cross-ploughed; upon which earth it was ox-arowed; that is, with the great harrows rawn by horses. Next it was ridged up again into  $3\frac{1}{2}$  feet lands, and harrowed with one horse.\* In *October* it was drilled with wheat; 4 rows on each land, 8 inches under, with 1 bushel *per acre*. After which the furrows were struck as usual with double mould-board plough, and the field water-furrowed.

The 14th of *November*, one land was manured with rabbit dung, at the rate of

\* This is done with one horse walking in the furrow, drawing two small harrows, each covering a land.

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18 facks *per* acre, at 1 s. 2 d. a fack. Another land with poultry dung, at the rate of 72 bushels *per* acre, at 6 d. And a third with wood ashes, the same quantity, at 4 d. The poultry dung turned out much the best; the rabbit next; and the ashes last. In *March* all the rest of the field was manured with 20 facks an acre of rabbit dung. It was hand-weeded once between the rows and shinned twice in the intervals of 1 foot 6 inches, and once with the double mould-board. The product 3 quarters *per* acre.

*Expences.*

First ploughing,	-	-	£.0	12
N. B. The land very dry.				
Second ditto,	-	-	0	10
Harrowing twice, 6 horses,			0	3
Ridging up,	-	-	0	4
Harrowing,	-	-	0	0
Drilling,	-	-	0	1
Seed,	-	-	0	6
Striking furrows,	-	-	0	1
Water-furrowing,	-	-	0	1
20 Sacks rabbit dung, at 1 s. 2 d.			1	3
Hand-hoeing,	-	-	0	4
Shim,	-	-	0	1
Double mould-board,			0	1
Reaping,	-	-	0	8
Carry over,	-	-	3	17

## THROUGH ENGLAND. 339

Brought over,	-	-	£.3	17	9
Harvesting,	-	-	0	5	0
Thrashing,	-	-	0	9	0
Carrying out,	-	-	0	1	6
Rent, &c.	-	-	1	2	0
			5 15 3		

### *Produce.*

3 Quarters, at 50s.	-	-	7	10	0
1 ½ Load straw, at 25s.	-	-	1	17	6
			9 7 6		
Expences,	-	-	5	15	3
Profit,	-	-	3	12	3
			28 18 0		

### *Observations.*

Here ends a course of 4 years drilling on the same land; it includes, therefore, all the circumstances that could affect common methods—whether favourable or unfavourable. The land was received in foul order—no other fallow was given to clean it than drilled crops; that material was answered, and the products at the same time profitable. But the merit of the culture will best appear from throwing the whole into one view.

	Expences, £.	Product, £.	Profit, £.
1767. Beans.	3 19 6	6	1 6
1768. Wheat.	5 15 8	12 0 0	6 4 4
1769. Beans.	3 9 6	6 0 3	2 10 8
1770. Wheat.	5 15 3	9 7 6	3 12 3
Totals per acre,	18 19 11	33 8 9	14 8 9
Ditto of the 8 acres,	151 19 4	267 10 0	115 10 0
Average per acre per ann.	4 14 11	8 7 2	3 12 2
Per 100 acres per ann.	474 11 8	835 16 8	360 16 8

This table shews the exact degree of the advantage of the drill culture. The point to be most attended to, is the profit of 3*l.* 12*s.* 2*d.* per acre per ann.; upon which it may be observed, that there is not the least reason to suppose the common method would have equalled it. One summer fallow at a dead expence would have been included; and in all probability without producing better successive crops. The farmers course here



is, 1. Fallow; 2. Wheat; 3. Oats; 4. Clover; 5. Wheat; 6. Oats. Now it must be at once apparent to the most common apprehension, that this course cannot possibly equal the profit of 3*l.* 12*s.* 2*d.* *per* acre.

But without recurring to an ideal comparison, is it not a noble anecdote in the history of drilling, that an annual *clear* profit of 360*l.* 16*s.* 8*d.* may be made from 100 acres of ploughed land? — by no means of superior goodness. If such a fact, deduced from the experience of four years, and not on a small patch of land, but over a large field, does not absolutely prove the benefit of this mode of drilling, nothing can, nor is there a fact in all husbandry.

Respecting the probability of a farmer's success in it; it is to be observed, that what a gentleman profitably executes *in large*, may undoubtedly be advantageously practised by a farmer; but if he curtails the expences, (which are high) or deviates from the directed path, it certainly is no fault of the husbandry, but of the husbandman. The drill plough with which these crops were drilled, admits of many variations, and yet is scarcely ever out of order; as any one may judge from the circumstance of its

## 342 THE FARMER'S TOUR

having drilled some hundreds of acres without the least repair.

This succession of drilled beans and wheat, shews plainly that those vegetables may follow one another for any number of years without any fallow—and this on land, as I before observed, not of the best quality.

*Experiment, No. 32.*

*Culture, expences, and produce of seven acres of drilled beans.*

1768.

*Culture.*

The soil of this field is the same as that of the four preceding trials. In 1766, it yielded oats; the stubble of which, very foul with twitch, was ploughed up early in the spring of 1767. It was sown with hemp, with a design to clean it, by the advice of Dr. Solander; but it did not succeed; either from the poverty of the soil, from dry weather, or some other circumstances. It came to nothing; was therefore ploughed up in June, and afterwards cross ploughed. Next it was dragged with the great ox-drag, drawn by 6 horses, going thrice in a place. After this it was ploughed flat, and cut up whole furrow, though the surface of the ground was like dust: this was

owing to the excessive weight of the draught. It then remained in this condition till dry enough to be made fine by harrowing and rolling; ridged up, into  $3\frac{1}{2}$  feet lands, the beginning of *September*. After this, so much rain came that it was impossible to drill wheat as intended; it was therefore water-furrowed and left till the winter.

It is here to be observed, that this disappointment was very much owing to the dragging: the draft and the pressure of the tines absolutely ruined the season; which is no uncommon effect with this preposterous machine, so much exceeded in utility on strong land by the spiky roller. The ploughing up whole furrow after this operation sufficiently proves it.

In *February*, 1768, the ridges were harrowed and drilled with horse-beans, double rows, at 14 inches on each, 1 bushel seed *per* acre. After which the water-furrows were ploughed and dug. In *April* the rows hand-hoed; and the beginning of *May* the 14 inch partition was horse-hoed with a 9 inch shim, and the intervals with a 17 inch one: one horse did 5 acres a day. The furrows were then struck with a double mould-board plough. The begin-

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ning of *June* hand-hoed again; after which it was again horse-hoed by shim and double mould-board. When ripe they were pulled by women. The product  $3\frac{1}{2}$  quarters *per* acre.

### *Expences.*

1767.	First ploughing,	-	£.0	10	0
	Second ditto,	-	0	7	6
	Third ditto,	-	0	7	6
	Dragging,	-	0	4	6
	Fourth ploughing,	-	0	7	6
	Harrowing,	-	0	1	0
	Fifth ploughing,	-	0	4	6
	Water-furrowing,	-	0	1	6
1768.	Harrowing,	-	0	0	6
	Drilling,	-	0	1	6
	Seed,	-	0	3	6
	Water-furrows,	-	0	1	6
	Two hand-hoeings,	-	0	7	0
	Shim twice,	-	0	1	4
	Double mould-board ditto,	0	2	4	0
	Pulling,	-	0	6	0
	Binding,	-	0	1	0
	Harvesting,	-	0	4	0
	Thrashing, $3\frac{1}{2}$ quarters,				
	at 1s. 4d.		0	4	8
	Two years rent, &c.		2	4	0
			<hr/>	<hr/>	<hr/>
			6	1	4

THROUGH ENGLAND. 345

Expences,                 =         £.6   1   4

*Product.*

½ Quarters, at 28s.	£.4	18	0	
Load straw,	1	0	0	
		5	18	0
Loss,		0	3	4

*Observations.*

Mr. *Arbutnot's* plan of culture for these  
 elds, was to clean and bring them into  
 heart by drilling: the loss of the first year,  
 with accumulated expences, was wholly  
 owing to his adopting a hint of an ingeni-  
 us foreigner: the scheme of hemp on land  
 run out of heart and full of weeds was a bad  
 one: hemp so far destroys weeds as to require  
 no hand-hoeing or weeding; but then it must  
 be sown on land in heart, sufficient to push it  
 on to a vigorous luxuriant growth. Instead  
 of hempen fallow, beans were to have  
 been drilled, which would, as in the pre-  
 ceding field, have cleaned the land, and  
 paid above 40s. an acre profit; and then  
 wheat with much greater advantage. This  
 loss is therefore no effect of drilling.

There is another observation to be made  
 here that may have its use; which is the  
 crop

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crop not being the better for succeeding a summer fallow. Possibly it may be a bushel or two superior, but nothing comparable to the expence: this should be a lesson to all farmers to make their drilled beans the fallow; and never bestow a preparatory one.

### *Experiment, No. 33.*

*Culture, expences, and produce of seven acres of drilled wheat.*

1769.

#### *Culture.*

The bean stubble of Experiment, No 32. was ploughed up directly after harvest the ridges being reversed, and harrowed once. It was then begun to be drilled; 6 lands were done with double rows, at 1 1/2 inc. 3 pecks seed; but such a deluge of rain then came, that the rest of the field was afterwards forced to be sown broad-cast and the seed covered by arching up the lands with a double plough, an invention of Mr. *Arbutnot's*, going once in a place a man, a boy, and two horses, did 5 acres a day: the quantity of seed used, 1 1/2 bushels per acre. 15 Sacks an acre of rabbit dung

wer

were sown over the whole field, except the  
ridges. The double mould-board plough  
followed the double plough in the furrows  
and struck them.

In *March* the 8 ridges were manured, at  
the rate of 15 sacks an-acre of rabbit dung.  
In *April* they were hand-hoed, and the  
intervals horse-hoed with shim and double  
mould-board plough. In *May* all these  
operations were repeated; and the two last  
once more in *June*. The broad-cast was  
hand-weeded once. Product *per acre*, of  
the broad-cast, 18 bushels; of the drilled,  
7½ bushels. A load and half of straw to  
the first, and a load to the second.

*Account of the broad-cast per acre.*

*Expences.*

First ploughing,	- - -	£. 0	7	6
Farrowing,	- - -	0	1	0
Seed,	- - -	0	9	0
Sowing,	- - -	0	0	3
Second ploughing with double				
plough,	- - -	0	1	3
5 Sacks rabbit dung,	-	0	19	0
striking furrows with 3 horses,		0	2	0
Water-farrowing,	-	0	1	6
			<hr/>	
Carry over,	=	2	1	6

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Brought over, - - -	£. 2	1	6
Hand-weeding, - - -	0	6	0
Reaping, - - - - -	0	9	0
Harvesting, - - - - -	0	4	0
Threshing 18 bush. at 4d. $\frac{1}{2}$ ,	0	6	9
Carrying out, - - - - -	0	1	6
Rent, &c. &c. ... - - -	1	2	0
		4	10 9

### *Produce.*

2 Quarters 2 bushels; at 40s.	4	10	0
1 $\frac{1}{2}$ Load straw, at 25s. - -	1	17	6
		6	7 6
Expences, - - - - -	4	10	9
		1	16 9

### *Account of the drilled per acre.*

#### *Expences.*

Ploughing, - - - - -	0	7	6
Harrowing, - - - - -	0	1	0
Drilling, - - - - -	0	1	6
Seed, - - - - -	0	4	6
Striking furrows, - - - - -	0	2	0
Water-furrowing, - - - - -	0	1	6
15 Sacks rabbit dung, - - -	0	19	0
Two hand-hoeings, - - - - -	0	7	0
		2	4 0



# THROUGH ENGLAND. 349

Brought over,	-	£.	2	4	0
him thrice,	-		0	2	0
ouble mould-board plough ditto,	-		0	3	6
earing,	-		0	7	6
arvesting,	-		0	3	9
hrashing, 17 $\frac{1}{2}$ , at 4 d. $\frac{1}{2}$ ,	=		0	6	7
arrying out,	-		0	1	6
ent, &c.	=		1	2	0
			4 10 10		

## *Produce.*

Quarters 1 bushel 2 pecks,					
at 40s.	-		4	7	6
Load straw,	=		1	5	0
			5 12 6		
Expences,	=		4	10	10
Profit,	-		1	1	8
Profit by the broad-cast,			1	16	9
Ditto by the drilled,	-		1	1	8
Superiority of the former,			0	15	1

## *Observations.*

The balance of this account is not a clear superiority to that amount, because the and in one case must certainly be left in better order than in the other—probably to the

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the amount of this balance. As to products, the drill has the advantage, for the saving in seed exceeds the superiority of product by one peck: this may however be called an equality.

### *Experiment, No. 34.*

*Culture, expences, and produce of seven acres of drilled beans.*

1770.

#### *Culture.*

In *October* the wheat stubble was thrown down and water-furrowed. In *November* 5 acres were drilled with mazagan beans 3 bushels *per* acre, in double rows, at 14 inches; and again water-furrowed. In *February* the remaining two acres were dibbled in the same manner with the same bean. They were hand-hoed once in *April* and horse-hoed with shim and double mould-board. The crop found on a trial of thrashing to be  $3 \frac{1}{2}$  quarters *per* acre or an average of the whole: but the *February* season not equal to *November* by 4 bushels

#### *Expences.*

Ploughing,	-	=	£.0	7	0
Water-furrowing,			0	1	0
Carry over,			0	8	0

# THROUGH ENGLAND. 351

Brought over,	-	£. 0	8	6
Drilling,	-	0	1	6
Seed,	-	0	12	0
Water-furrowing,	-	0	1	0
Hand-hoeing,	-	0	5	0
Whim,	-	0	0	8
Double mould-board	-	0	1	2
Pulling and binding,	-	0	10	6
Harvesting,	-	0	4	0
Threshing, at 1 s. 4d.	-	0	4	8
Rent,	=	1	2	0
<hr style="border-top: 1px solid black;"/>				
3 10 6				
<hr style="border-top: 1px solid black;"/>				

## *Produce.*

3 $\frac{1}{2}$ Quarters, at 40s.	-	7	0	0
1 Load of straw,	=	1	0	0
<hr style="border-top: 1px solid black;"/>				
8 0 0				
Expences,	=	3	10	6
Profit,	-	4	9	6
On the 7 acres,	-	31	6	6
<hr style="border-top: 1px solid black;"/>				

## *Observations.*

The register of this seven aced field during four years, has not, on the whole, turned out near so advantageous as the preceding field of 8 acres. This will appear from throwing the whole into one view, as I before practised with the field above-mentioned.

	Expences, £. 6 1 4	Product, £. 5 18 0	Loss, £. 0 3 4
1767 and 8. Beans.			
1769. Wheat.	4 10 10	5 12 6	Profit, 1 1 8
1770. Beans.	3 10 6	8 0 0	4 9 6
	<u>14 2 8</u>	<u>19 10 6</u>	<u>5 11 2</u>
Totals,	<u>98 18 8</u>	<u>136 13 6</u>	<u>0 3 4</u>
Ditto of the 7 acres,			<u>5 7 10</u>
Average per acre per ann.	<u>3 10 8</u>	<u>4 17 7</u>	<u>1 1 11</u>

The deficiency of a greater profit here, is not to be so much wondered at as the existence of any. The heavy expence of a fallow instead of a profitable crop, which reduced the wheat years to one, changed the account from the very beginning:—under such disadvantages the clear annual profit of a guinea is by no means inconsiderable; indeed

indeed, it is more than one farmer in an hundred makes. If two profitable crops be substituted in the room of the unprofitable one of the two first years, which would have been the case, had not the hemp been sown, the account would, on the whole, have been very advantageous.

*General observations on experiments 28, 29, 30, 31, 32, 33, and 34.*

Mr. *Arbutnot* threw these two fields into the alternate husbandry of beans and wheat, to discover if the land could probably be kept clean without a fallow: the affirmative is proved very strongly in these trials; for the fields are both much cleaner than any farmer's stubbles in the country, and the bean one again ready for wheat, it was thought proper to sow that grain; but having conducted the trial through course of four years, the conclusions are as clear, as if it was extended to fourteen: for the disadvantages, which have occurred in the last registered field, are greater, in all probability, than would happen in any succeeding four. That land may be kept clean, therefore, by the course of beans and wheat

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alternately, both being drilled, and the profit arising considerable, cannot for a moment be doubted.

But, at the same time that this gentleman is well convinced of the fact, yet he is of opinion, that it would be more profitable to crop such land in a different manner. He purposes throwing one of these fields into the following round  
 1. Cabbages. 2. Windsor beans. 3. Oats  
 4. Clover. 5. Wheat. Which he apprehends will turn out more advantageous and in this he is certainly right: for the quantity of manure arising from the cattle which are maintained by the cabbages and the clover, will enrich the land to a very great degree; and in the conduct of such a course, if all the dung arising from the field was duly returned to it, the exact advantage of it would be found, which otherwise cannot be.

*Experiment, No. 35.*

*Culture, expences, and produce, of five acres of drilled wheat.*

1768.

*Culture.*

The soil of this field is a light loam, but not light enough for feeding turnips &c.

## THROUGH ENGLAND. 355

In 1767 it yielded pease, the stubble of which was ploughed up in *September*, and then thrown on to lands  $3\frac{1}{2}$  feet wide: harrowed in 3 quarters *per* acre of sheep trotters, and drilled each land with double rows of wheat, at 14 inches, using one bushel *per* acre of seed. The rows were once hand-hoed, and twice horse-hoed with shim and double mould-board plough: the product  $2\frac{1}{2}$  quarters *per* acre.

### *Expences.*

First ploughing,	-	£. 0 8 6
Second ditto,	-	0 7 6
Harrowing,	-	0 1 0
Three quarters of trotters,		1 7 0
Carriage ditto,	-	0 3 0
Sowing ditto,	-	0 1 6
Drilling,	-	0 1 6
Seed,	-	0 5 6
Water-furrowing,	-	0 1 0
Hand-hoeing,	-	0 4 0
Shim twice,	-	0 1 4
Double mould-board,	-	0 2 4
Reaping,	-	0 8 0
Harvesting,	-	0 3 6
Thrashing $2\frac{1}{2}$ quarters,	-	0 7 6
Carrying,	-	0 2 6
Rent, &c.	-	1 2 0
A a 2	Total,	5 7 8

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### *Produce.*

Two qrs. and a half, at 52 s. 6 d.	6	11	3
Straw, one load, -	1	5	0
Total, -	7	16	3
Expences, - - -	5	7	8
Profit, - - -	2	8	5
Ditto on the five, -	12	2	1

### *Experiment, No. 36.*

*Culture, expences, and produce, of five acres  
of drilled wheat.*

1768.

### *Culture.*

The soil a strong loam, tending to clay  
the tillage, seed, hoeing, &c. the same as  
No. 35. The product 3 quarters *per acre.*

### *Expences.*

As before, except thrashing,	5	0	
Thrashing, - - -	0	8	0
Total, -	5	8	0

### *Produce.*

Three quarters, at 52 s. 6 d.	7	17	
Straw, one load, -	1	5	0
Total, -	9	22	0
Expences, - - -	5	8	0
Profit, - - -	3	13	0



*Experiment, No. 37.*

*Culture, expences, and produce, of seven acres and three roods of drilled wheat.*

1770.

*Culture.*

The soil of this field is a strong loam, on a brick earth. In 1768, it yielded tares, the stubble of which was ploughed up in *September*, twelve inches deep. In *May*, 1769, it was hunted, and soon after cross-ploughed, and rolled with spiky roller. Ridged up half the field in *August*, in  $3\frac{1}{2}$  feet lands, and harrowed the other half with ox-harrows twice. Drilled the ridged half with a bushel an acre of wheat, 4 rows on each land; and, as soon as it was finished, the furrows were struck with the double mould-board plough. The other half was sown broad-cast, 2 bushels per acre, and ploughed in, after which the whole was water-furrowed.

In *February*, 16 sacks an acre of rabbit dung spread over the whole. The drilled half was once hand-hoed, and the broad-cast hand-weeded. The products — the drilled, three quarters, seven bushels, one peck and  $\frac{1}{2}$  per acre; and the broad-cast 4 quarters.

# 358 THE FARMER'S TOUR

*Account of the drilled.*

## *Expences.*

First ploughing,	-	£.	0	12	0
Water-furrowing,	-		0	1	0
Second ditto,	-		0	7	6
Third ditto, twelve inch,	-		0	12	0
Spiky roller,	-		0	2	0
Fourth earth,	-		0	5	0
Drilling,	-		0	1	6
Seed,	-		0	6	6
Striking furrows,	-		0	1	2
Water-furrowing,	-		0	1	0
Rabbit dung and sowing,			1	2	10
Hand-hoeing,	-		0	5	0
Reaping,	-		0	10	0
Harvesting,	-		0	3	0
Thrashing,	-		0	12	0
Carrying,	-		0	2	0
Rent, &c. &c.	-		2	4	0
			<hr/>		
Total,	-		7	9	0
			<hr/>		

## *Produce.*

3 qrs. 7 b. 1 ½ p. at 50s.			9	16	0
Straw, two loads, at 25s.			2	10	0
			<hr/>		
Total,	-		12	6	0
Expences,	-		7	9	0
			<hr/>		
Profit,	-		4	17	0
			<hr/>		

# THROUGH ENGLAND. 359

## *Account of the broad-cast.*

### *Expences.*

First ploughing,	-	£. 0	12	0
Water-furrowing,	-	0	1	0
Second earth,	-	0	7	6
Third ditto,	-	0	12	0
Spiky roller,	-	0	2	0
Harrowing,	-	0	3	0
Sowing,	-	0	0	3
Seed,	-	0	13	0
Fourth earth,	-	0	5	0
Water-furrowing,	-	0	1	0
Rabbit dung,	-	1	2	10
Weeding,	-	0	5	0
Reaping,	-	0	10	0
Harvesting,	-	0	3	6
Thrashing,	-	0	12	0
Carrying out,	-	0	2	0
Rent,	-	2	4	0
		<hr/>		
Total,	-	7	16	1
		<hr/>		

### *Produce.*

Four quarters, at 50 s.	-	10	0	0
Straw, two loads;	-	2	10	0
		<hr/>		
Total,	-	12	10	0
Expences,	-	7	16	1
		<hr/>		
Profit,	-	4	13	11
		<hr/>		
I				

## 360 THE FARMER'S TOUR

Profit by the drilled,	-	£. 4	17	0
————— broad-cast,		4	13	11
		<hr/>		
Superiority,	-	0	3	1
		<hr/>		

The equality of the two methods is here very remarkable; but the superiority may be fairly, according to this account, given the drill, on account not only of the 3s. but also the superior tillage the land receives in it. A hand-hoeing is far more beneficial than a weeding.

### *Observations on the preceding crops of drilled wheat.*

These experiments in drilled wheat include several seasons, various soils, and some difference in the methods of culture: hence they cannot fail discovering nearly the merit of this husbandry for wheat. I shall throw the trials into one view, that a clearer idea may be formed of the result.

Experiment.

Experiment, No.	29.	31.	33.	35.	36.	37.	Totals,	Averages,
i. s. d.	5 15 8	5 15 3	4 10 10	5 7 8	5 8 11	7 9 0	34 7 4	5 14 6
Product,	4 0 0	3 0 0	2 1 2	2 4 0	3 0 0	3 7 1½	18 4 3½	3 0 3
Profit,	6 4 4	3 12 3	1 1 8	2 8 7	3 13 7	4 17 0	21 17 5	3 12 10

This table exhibits the clearest circumstances in favour of drilling wheat, that I remember to have heard of; for here is, not one unprofitable crop, not one not with, but was manured, nor one that was not well cleaned by horse and hand-hoeing:

notwithstanding these expences, which attend much to enriching the land for following crops, yet is the neat profit so great as 3*l.* 12*s.* 10*d.* *per* acre; which certainly proves, in the clearest manner, that the methods of drilling here pursued are truly advantageous, and may be practised with as great a certainty of profit, as any part of the old husbandry. It has been common with many persons to declare against drilling from experience; but such, it is presumed, have practised Mr. *Tull's* method of wide intervals, for drilling the same land every year with wheat. Mr. *Arbutnot's* plan has been totally different; he has set his rows so close together, in several of his trials, that the field presently resembles a broad-cast one. The utility of drilling lies, first, in his being able, with one man, two horses, and a boy, to put in five or six acres in a day; whereas, in the common method of sowing under furrow on a fallow, one plough can finish but one acre after the seedsmen. Secondly, it consists in the easy admission of a hand-hoe between the rows, and the horse-hoes in the intervals; both which operations must be performed while the corn is young

and are done with much greater ease and expedition, than is possible with broadcast crops; though many farmers, in some parts of *England*, find it highly advantageous to hand-hoe all their wheat. The great success of this method is the best proof of its propriety; for drilling, that will pay so considerable a profit on the average of the above trials, ought to be esteemed decisively advantageous. The degree of benefit, which, in a long course, would result from keeping the land always clean while under wheat, cannot be accurately calculated: every crop would possess a share of it, and, beyond all doubt, every one would be regularly the better.

But Mr. *Arbutnot* here observes, that however advantageous these trials may appear, no person should think of practising the drill culture of wheat, unless he absolutely determines to keep the land as clean as a garden: the success depends on keeping this resolution. Under a more imperfect system, drilling would probably turn out worse than the common mode.

He further remarks, that these trials have been manured for often, but moderately: a conduct, which he finds much  
more

more beneficial than laying on a large quantity once in four or five years.

These trials are, upon the whole, decisive in favour of the mode of drilling here pursued, and will, for the future, prevent those general expressions of praise or condemnation, which we have so long heard in every thing that concerns the new husbandry.

### BEANS.

Besides the trials already registered on drilled beans among the preceding crops of wheat, Mr. *Arbutnot* has formed some others much deserving attention.

#### *Experiment, No. 38.*

*Culture, expences, and produce, of five acres of drilled beans.*

1767.

#### *Culture.*

The soil a strong loam, on a clay bottom, not manured for many years. In 1766, it yielded oats, the stubble of which was ploughed twelve inches deep in *December*, and so left till *April*, when it was harrowed



narrowed thrice, and drilled with tick beans, two bushels *per* acre, in double rows, at fourteen inches, with twenty-inch intervals. The end of *May* they were hand-hoed, and horse-hoed with shim and double mould-board plough. In *June*, all these operations were repeated. After the blossoming, the shoots above the flowers were cut off with a pease hook, at the length of about twelve inches: this was done to forward the ripening. The product three quarters *per* acre.

*Expences.*

First ploughing,	-	£. 0	12	0
Harrowing,	-	0	3	0
Drilling,	-	0	1	6
Seed,	-	0	7	0
Two hand-hoeings,	-	0	12	0
Shim twice,	-	0	1	4
Double mould-board ditto,	-	0	2	8
Cutting tops,	-	0	0	6
Reaping,	-	0	7	0
Harvesting,	-	0	4	0
Threshing,	-	0	3	6
Rent, &c.	-	1	2	0
		<hr/>		
Total,	-	3	16	6
		<hr/>		

# 366 THE FARMER'S TOUR

## Produce.

Three quarters, at 25s.		£. 3 15
Straw, one load,		* 1 0
Total,	-	<hr/> 4 15
Expences,	-	3 16
Profit,	-	<hr/> 0 18

## Experiment, No. 39.

*Culture, expences, and produce, of six acres of drilled beans.*

1768.

## Culture.

The soil of this field is a strong clay summer-fallowed in 1767, receiving, in all, three earths and one harrowing. In *February*, it was drilled with a bushel and half *per* acre of horse-beans, in double rows, at fourteen inches, with twenty eight inch intervals. They were hand hoed once, and horse-hoed with shim and double mould-board once. The produce three quarters *per* acre.

## Expences.

Three earths,	-	-	1 10
Harrowing,	-	-	0 1
Drilling,	-	-	0 1
Carry over,			<hr/> 1 12

\* It is to be observed, that for cart-horses bearing straw, when well got in, is as good as middling hay.

# THROUGH ENGLAND. 367

	Brought over,	£. 1	12	6
Seed, - - -		0	5	0
Water-furrowing, - - -		0	0	6
Hand-hoeing, - - -		0	4	0
Shim, - - -		0	0	8
Double mould-board plough,		0	1	2
Reaping, - - -		0	7	0
Harvesting, - - -		0	5	0
Thrashing, at 1 s. 4 d. - - -		0	4	0
Rent, &c. - - -		2	4	0
Total, - - -		5	3	10

## *Produce.*

Three quarters, at 28 s. - - -	4	4	0
Straw, one load, - - -	1	0	0
Total, - - -	5	4	0
Expences, - - -	5	3	10
Profit, - - -	0	0	2

This is a fresh instance, that beans must always be made the fallow, and not have the expences of a preparatory one to pay; for the crop does not appear to be the better: a circumstance fully sufficient to decide the matter.

# 368 THE FARMER'S TOUR

*Experiment, No. 40.*

*Culture, expences, and produce, of five acres of drilled beans.*

1769.

*Culture.*

The five acres of experiment, No. 38, were this year again drilled with beans: the wheat stubble that intervened ploughed at *Michaelmas*, and again in *January*. In *February* harrowed it, and drilled with two bushels *per* acre of tick beans, in double rows of fourteen inches, with intervals of two feet. In *April*, shinned the rows, and then harrowed the land across. In *May*, hand-hoed the rows, and then horse-hoed with shim and double mould-board plough. The crop three quarters *per* acre.

*Expences.*

First ploughing,	-	-	£.	0	7	6
Water-furrowing,	-	-		0	0	3
Second earth,	-	-		0	7	6
Harrowing,	-	-		0	0	6
Drilling,	-	-		0	1	6
Seed,	-	-		0	6	9
Hand-hoeing,	-	-		0	5	9
Shim twice,	-	-		0	1	2
Double mould-board once,				0	1	4
Reaping,	-	-		0	6	0
Carry over,				1	16	1

THROUGH ENGLAND. 369

	Brought over,	£. 1 16 11
Harvesting,	-	0 4 0
Thrashing,	-	0 4 0
Rent, &c.	=	1 2 0
		<hr/>
	Total,	3 6 11
		<hr/>

*Produce.*

Three quarters, at 25s.	-	3 15 0
Straw, 1 $\frac{1}{4}$ load,	=	1 5 0
		<hr/>
	Total,	5 0 0
Expences,	=	3 6 11
		<hr/>
Profit,	-	1 13 1
		<hr/>

*Experiment, No. 41.*

*Culture, expences, and produce, of five acres of drilled beans.*

1769.

*Culture.*

The soil the same as No. 40; also the culture. The produce three quarters and a half *per* acre.

*Expences.*

Sundries, as before,	=	3 6 11
		<hr/>

# 370 THE FARMER'S TOUR

## Produce.

3 $\frac{1}{2}$ quarters, at 25s.	-	£.4	7	6
Straw, 1 $\frac{1}{4}$ load,	-	1	5	0
		<hr/>		
		5	12	6
Expences,	-	3	6	11
		<hr/>		
Profit,	-	2	5	7
		<hr/>		

## Experiment, No. 42.

*Culture, expences, and produce of three acres of drilled beans.*

1770.

### Culture.

The soil a strong yellow loam on a clay bottom; yielded wheat in 1769. The stubble was ploughed in *November*; and in *February* drilled with mazagan beans in double rows, 14 inches, with intervals of 2 feet 4 inches; 3 bushels of seed *per acre*. In *May* they were horse-hoed with shim and double mould-board plough; and in *June* hand-hoed. Produce 4  $\frac{1}{2}$  quarters *per acre*.

### Expences.

Ploughing,	-	£.0	7	6
Water-furrowing,	-	0	1	0
Drilling,	-	0	1	3
		<hr/>		
Carry over,		0	9	9

# THROUGH ENGLAND. 371

Brought over	-	£.	0	9	9
Seed,	-		0	12	0
Shim,	-		0	0	8
Double mould-board,	-		0	1	2
Hand-hoeing,	-		0	6	0
Pulling and binding,	-		0	10	0
Harvesting,	-		0	3	0
Threshing,	-		0	5	0
Rent,	-		1	2	0
<hr style="border: 1px solid black;"/>					
3 9 7					
<hr style="border: 1px solid black;"/>					

## *Produce.*

½ Quarters, at 32 s.	-	7	4	0
straw, 1 ½ load,	-	1	10	0
<hr style="border: 1px solid black;"/>				
8 14 0				
Expences,	-	3	9	7
<hr style="border: 1px solid black;"/>				
Profit,	-	5	4	5
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## *Experiment, No. 43.*

*Culture, expences, and produce of three acres  
of drilled beans.*

1770.

### *Culture.*

The soil a very stiff yellow clay; crop-  
ped with wheat in 1769; the stubble  
ploughed at *Christmas* and harrowed. In

## 372 THE FARMER'S TOUR

*February* it was set with mazagan beans 3  $\frac{1}{2}$  bushels *per* acre. It was hand-hoed once, and horse-hoed with shim and double mould-board once. Produce, 4  $\frac{1}{2}$  quarters *per* acre.

### *Expences.*

Ploughing,	-	-	£. 0	7
Harrowing,	"	"	0	1
Setting,	"	"	0	7
Seed,	"	"	0	14
Hand-hoeing,	"	"	0	10
Shim,	"	"	0	0
Double mould-board,	"	"	0	1
Pulling and binding,	"	"	0	10
Harvesting,	"	"	0	10
Thrashing,	"	"	0	5
Rent, &c.	"	"	1	2
			<hr/>	
			4	8

### *Produce.*

4 $\frac{1}{2}$ Quarters, at 32 s.	"	"	7	4
Straw, one load,	"	"	1	0
			<hr/>	
			8	4
Expences,	"	"	4	8
			<hr/>	
Profit,	"	"	3	15



# THROUGH ENGLAND. 373

## Experiment, No. 44.

Culture, expences, and produce of four acres  
of drilled beans.

1770.

### Culture.

The soil a good sandy loam on clay: cropped with wheat in 1769; the stubble trench ploughed with *Ducket's* plough, 10 inches deep, in *October*. In *November* it was harrowed, and drilled with mazagan beans in double rows, 14 inches asunder, with 18 inch intervals: 4 bushels of seed. In *April* they were hand-hoed, and then shimmied; and the beginning of *June* hand-hoed and shimmied again. Produce, 4  $\frac{1}{2}$  quarters *per* acre.

### Expences.

Ploughing,	-	-	£. 0	12	0
Harrowing,	-	-	0	1	0
Drilling,	-	-	0	1	6
Seed,	-	-	0	16	0
Water-furrowing,	-	-	0	1	3
Twice hand-hoeing,	-	-	0	8	6
Shim twice,	-	-	0	1	4
Pulling and binding,	-	-	0	10	0
Harvesting,	-	-	0	4	0
			<hr/>		
Carry over,	-	-	2	15	7

## 374 THE FARMER'S TOUR

Brought over,	-	£. 2 15 7
Thrashing,	-	0 5 0
Rent,	-	1 2 0
		<hr/>
		4 2 7
		<hr/>

### *Produce.*

4 $\frac{1}{2}$ Quarters, at 32 s.	-	7 4 0
Straw, 1 $\frac{1}{4}$ load,	-	1 5 0
		<hr/>
		8 9 0
Expences,	-	4 2 7
		<hr/>
Profit,	-	4 6 5
		<hr/>

### *General observations.*

These experiments on beans including many variations of soil, culture, and sort, the conclusions to be drawn from them will appear with the greater clearness, by forming a table of averages as before done with the wheat crops.

# THROUGH ENGLAND. 375

Experiment, No. 28.	Expenses,	l. s. d.	Product,	q.	b. p.	Profit,	l. s. d.
30.	3 19 6	3 19 6	3 3 3	3 0 0	Profit,	2 1 6	
32.	3 10 8	3 10 8	3 3 3	3 0 0	Loss,	2 19 4	
34.	3 1 4	3 1 4	3 3 3	3 4 0	Profit,	0 3 4	
38.	3 10 6	3 10 6	3 3 3	3 4 0	Profit,	4 9 6	
39.	3 16 6	3 16 6	3 3 3	3 0 0		0 18 6	
40.	5 3 10	5 3 10	3 3 3	3 0 0		0 0 2	
41.	3 6 11	3 6 11	3 3 3	3 0 0		1 13 1	
42.	3 6 11	3 6 11	3 3 3	3 4 0		2 5 7	
43.	3 9 7	3 9 7	4 4 4	4 4 0		5 4 5	
44.	4 8 4	4 8 4	4 4 4	4 4 0		3 15 8	
	4 2 7	4 2 7	4 4 4	4 4 0		4 6 5	
<b>Totals,</b>	44 16 8	44 16 8	39	39 4 0	Loss,	27 17 6	
					Profit,	27 10 10	
<b>Averages,</b>	4 1 6	4 1 6	3	3 4 2		2 10 0	

## 376 THE FARMER'S TOUR

The clear profit of 2*l.* 10*s.* an acre on such a variety of crops, most of which are mere fallows for wheat, is much more considerable than attends the bean culture throughout nine tenths of the kingdom. This great superiority is owing to the uncommon attention to keeping them perfectly clean by hand and horse-hoeing; drilling gives a fair opportunity for exerting culture of this sort; and it is evident from the crops, how much benefit they reap by this conduct. Common farmers do not make near such a profit by wheat. What therefore can those counties say to this, who continue in the absurd course of  
1. Fallow; 2. Wheat; 3. Beans? Let them peruse these experiments with candor: Let them try the result: It is impossible but they must acknowledge the infinite superiority.

### PEASE.

*Experiment, No. 45.*

*Culture, expences, and produce of five acres  
of drilled pease.*

1767.

*Culture.*

The soil of this field is a poor sandy loam. It yielded wheat in 1766; the sub-

le of which was ploughed 12 inches deep  
 n *December*. In *April* ox-harrowed and  
 rofs ploughed, and then harrowed twice  
 ore; after which it was ridged up in  $3\frac{1}{2}$   
 eet lands; and being harrowed once were  
 rilled in double rows, at 14 inches; the  
 nterval 2 feet 4 inches, with  $1\frac{1}{2}$  bushel  
 er acre of dwarf marrowfat pease. In  
*May* they were hand-hoed, and horse-hoed  
 with shim and double mould-board plough.  
 n *June* these three operations were repeated.  
 The crop 14 bushels *per* acre.

*Expences.*

First ploughing,	-	-	£. 0	12	0
Harrowing,	-	-	0	2	0
Second ploughing,	-	-	0	7	6
Harrowing,	-	-	0	1	0
Third ploughing,	-	-	0	6	0
Harrowing,	-	-	0	0	6
Drilling,	-	-	0	1	6
$\frac{1}{2}$ Bushel feed,	-	-	0	12	0
Two hand-hoeings,	-	-	0	10	0
Shim twice,	-	-	0	1	4
Double mould-board plough ditto,	0		0	2	8
Hooking,	-	-	0	6	0
Harvesting,	-	-	0	4	0
Thrashing,	-	-	0	2	4
			<hr/>		
Carry over,			3	8	10

## 378 THE FARMER'S TOUR

Brought over,	-	£.3	8	10
Carrying out,	-	0	1	0
Rent, &c.	-	1	2	0
		<hr/>		
		4	11	10
		<hr/>		

### *Produce.*

14 Bushels, at 6s. 6d.	-	4	11	0
½ Load straw, at 15s,	=	0	7	6
		<hr/>		
		4	18	6
Expences,	-	4	11	10
		<hr/>		
Profit,	-	0	6	8
		<hr/>		

### *Experiment, No. 46.*

*Culture, expences, and produce of two acres of drilled pease.*

1767.

#### *Culture.*

The soil a sandy loam on a brick earth; summer fallowed in 1766, when it received four ploughings and two ox-harrowings; being left on the 4 foot ridge by the last earth in autumn. It would not have been summer fallowed, but was designed for madders; only the plants fell short. In *April* the ridges were reversed by a ploughing, 10 inches deep. It was then harrowed; and about

THROUGH ENGLAND. 379

About the end of *May* drilled with 2 bushels in an acre of blue union pease, in double rows, of 14 inches, and 2 feet 10 inch intervals. They were once hand-hoed, and horse-hoed with shim and double mould-board once. They were sold green in *September*. The product 10 sacks *per* acre, at 7*s*, a sack.

*Expences.*

766.	Four ploughings, -	£. 1	12	6
	Two ox-harrowings,	0	2	0
767.	Ploughing, -	0	10	0
	Harrowing, -	0	0	6
	Drilling, -	0	1	6
	2 Bushels feed, -	0	14	0
	Hand-hoeing, -	0	6	0
	Shim, - - -	0	0	8
	Double mould-board,	0	1	2
	Rent, - - -	2	4	0
		<hr/>		
		5	12	4

*Produce.*

0 Sacks, at 7 <i>s</i> .	£. 3	10	0	
Straw, - - -	1	0	0	
	<hr/>			
		4	10	0
	<hr/>			
Loss, - - -		1	2	4
	<hr/>			

## 380 THE FARMER'S TOUR

*Experiment, No. 47.*

*Culture, expences, and produce of four acres  
of drilled pease.*

1768.

*Culture.*

Soil, a sandy loam, was cropped with oats in 1767; the stubble of which was ploughed up in *January*. Cross ploughed the beginning of *April*, and harrowed twice. Manured it with 10 loads an acre of *London* dung, which were ploughed in and the land harrowed. It was then landed up on to 3  $\frac{1}{2}$  feet ridges, harrowed, and drilled with dwarf marrowfat pease, 1  $\frac{1}{2}$  bushel an acre, in double rows, at 14 inches with intervals of 2 feet 4 inches. They were once hand-hoed, and horse-hoed twice with shim, and once with the double mould-board plough. The crop was sold on the land for pods, at 3*l.* an acre, but extremely blighted.

*Expences.*

First ploughing,	-	£. 0	7	6
Second ditto,	-	0	7	6
Harrowing,	-	0	2	0
10 Loads dung, (54 bushels each)				
at 10 <i>s.</i>	-	5	0	0
Third ploughing,	-	0	4	6
Carry over,	•	6	1	6



# THROUGH ENGLAND. 381

Brought over,	-	£. 6	1	6
Harrowing,	-		0	0
Fourth ploughing,	-		0	4
Harrowing,	-		0	0
Drilling,	-		0	1
1 ½ Bushel feed,	-		0	10
Hand-hoeing,	-		0	5
Shim,	-		0	1
Double mould-board plough,	-		0	1
Rent, &c.	-		1	2
			8	8
			6	6

## *Produce.*

Crop,	-	£. 3	0	0
Straw,	-		0	15
			3	15
			6	0
Loss,	-		4	13
			6	6

## *General observations.*

The success of drilling pease has proved very bad in these trials, and yet the attention given the crops was by no means deficient. The most proper fields in the farm were chosen, and no omissions were made in the cleaning them while growing. The event does not condemn the drill culture of this vegetable, because the trials are not numerous, and were confined to two sorts of

of pea only; neither of which is much cultivated any where, except in the neighbourhood of *London*.

Experiment, No. 46.	Loss,	£. 1	2	4
	47. Ditto,	4	13	6
		<hr/>		
		5	15	10
	45. Profit,	0	6	8
		<hr/>		
Total loss,	-	5	9	2
		<hr/>		
Average,	-	1	16	4
		<hr/>		

It would be preposterous to assert, from the above experiments, that these pease cannot be profitably cultivated: at the same time it should be remarked, that the great advantages to be expected depend on accidental circumstances, particularly on the price being high at market. But even in that case, the gentleman, who cannot attend the sale, must not expect the profit of gardeners. This last circumstance, attended with the uncertainties of the crop, has made Mr. *Arbutnot* determine to leave it out of his course, and substitute beans, which he can consume himself, or always find a ready market for.

He entertains no doubts concerning the propriety

propriety of drilling pease from the preceding ill success; on the contrary, in case he cultivates them in future, he is fully determined never to sow them in any other manner; not only from the conviction of his reason, but also from various observations. He recommends for small pease, double rows, at 14 inches, with 2 feet intervals; the two rows should, while young, be thrown so much together by the double mould-board plough, as to seem to form but one row: but great care must be taken to do it early enough to avoid breaking the haulm. The weeds had better get up, than the vine be disturbed when of any growth.

## TURNIPS.

*Experiment, No. 48.*

*Culture, expences, and produce of four acres of drilled turnips.*

1768.

*Culture.*

The pea stubble of Experiment, No. 47. was ploughed up immediately after gathering: the whole was then dunged again with 10 loads an acre from the farm yard; which was then turned in by another ploughing,

ploughing, throwing it on to 4 feet lands after harrowing they were part drilled; one acre with common turnips broad-cast, and 3 acres drilled with *Reynold's* turnip; double rows, at 14 inches, with 2 feet 4 inch interval; both the beginning of *August*. They were once hand-hoed, but horse hoeing was prevented by wet. The common turnips were consumed by ewes and lambs, and were worth 3*l.* The other were fed off in *April*; the 3 acres kept 140 ewes and 140 lambs a fortnight; worth 3*d.* a couple *per* week. They eat them greedily; when pared down to the ground they were taken up with turnip hooks and the sheep eat them clean. The weight of the plants did not exceed  $\frac{1}{4}$  of a *lb.* top and all: The shoots were 2 feet high the middle of *April*.

## Account of the turnips.

*Expences.*

Furrowing,	-	-	£. 0	3
Manuring, 10 loads, at 6 <i>s.</i>	-	-	3	0
Ploughing,	-	-	0	7
Harrowing,	-	-	0	1
Sowing and seed,	-	-	0	1
Hand-hoeing,	-	-	0	6

---

 3 18

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Brought over, total expences, £. 3 18 6

*Produce.*

Value of the crop,	-	-	3	0	0
Loss,	-	-	0	18	6

Account of Reynolds's turnips.

*Expences.*

Currowing,	-	-	0	3	0
Manuring,	-	-	3	0	0
Ploughing,	-	-	0	7	6
Harrowing,	-	-	0	1	0
Drilling,	-	-	0	1	6
Seed,	-	-	0	1	6
Hand-hoeing,	-	-	0	7	0
			4	1	6

*Produce.*

By keeping 140 sheep 2 weeks,  
at 3d. 3l. 10s.; the third of  
which is,

	-	-	1	3	4
Loss,	-	-	2	18	2
Nett by common turnips,			0	18	6
Excess of the former,	-	-	1	19	8

*Observations.*

This experiment is not offered as a full comparison between the two plants, because *August* is too late for either, and particularly so for the cabbage turnip, which is directed to be sown in *March*, and planted in *June*; it had not therefore a fair trial; but it is of no slight consequence to know that the common turnip will yield so large a produce as 3*l.* an acre from so late a sowing; and at the same time that the other plant will then produce but a trifling crop: this is evidently proved: a crop of turnips of 3*l.* after pease of the same year, is highly beneficial.

*Experiment, No. 49.*

*Culture, expences, and produce, of two acres of drilled turnips.*

1768.

*Culture.*

Two acres of strong loam, on brick earth, yielded drilled pease in 1767; the stubble ploughed in *October*, and the land water-furrowed. In *April* it was stirred again and harrowed. After this, it was

eft till *June*, when it received another ploughing and harrowing: the 30th, drilled it in double rows, at fourteen inches, with two feet ten inch intervals. As soon as the plants came up, fix sacks per acre of wood ashes were sown over them, not only as a manure, but to preserve them from the fly. They were hand-hoed twice, and horse-hoed with shim and double mould-board plough as often. The consumption of the crop was as follows: an high head-land on one side the field was ploughed twelve inches deep, and one sheep folded on it, after being well littered with straw: the turnips were then given in cribs: the two acres kept 164 sheep and lambs six weeks and two days; they were turned out of the pen at noon: the value of the keeping 2*d.* a week.

*Expences.*

First ploughing,	-	£. 0	7	6
Water-furrowing,	-	0	0	3
Second ploughing,	-	0	6	0
Harrowing,	-	0	1	0
Third ploughing,	-	0	6	0
Carry over,	-	1	0	9

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Brought over,	-	£. 1	0	9
Drilling,	-	0	1	6
Seed,	-	0	0	4
Wood ashes and sowing,	-	0	6	0
Hand-hoeing twice,	-	0	8	0
Shim twice,	-	0	1	4
Double mould-board plough ditto,		0	2	0
Carting to the fold,	-	0	15	4
Rent,	-	1	2	0
		<hr/>		
Total,	-	3	18	3

*Produce.*

Keeping 164 sheep six weeks and two days, at 2d. 4l. 2s.; the half is	-	-	2	1
		<hr/>		
Loss,	-	-	1	17
		<hr/>		

*Experiment, No. 50.*

*Culture, expences, and produce, of three  
acres of drilled turnips.*

1770.

*Culture.*

This piece yielded turnips in 1769, and was designed for madder; but plants were wanting: trench-ploughed it in June, and drilled it the 10th of July; part in row, equal



equally distant, three feet, with rows of lucerne between. They were twice hand-hoed, and shinned three times: the lucerne was destroyed by the fly, before they began the turnips, the latter being saved by burning weeds. The rows, at 8 inches, were attacked by a grey grub; root was sown to kill them; but had no effect. Part of this piece is a gravelly soil; and it is remarkable, that the grub was at only those parts; this was probably owing to the more luxuriant growth of the best of the field. The eighteen-inch rows were only hand-hoed, as these intervals would not admit the horse-hoe, without danger of burying the plants.

*Expences.*

Ploughing,	-	-	£.	0	10	0
Harrowing,	-	-		0	1	0
Drilling,	-	-		0	0	6
Seed,	-	-		0	0	2
Hand-hoeing twice,	-	-		0	9	0
Shim twice,	-	-		0	1	4
Rent, &c.	-	-		1	2	0
				<hr/>		
Total,	-	-		2	4	0
				<hr/>		

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One square perch, the best that could be found among the eighteen- inch rows, was pulled and weighed, - -	210 lb.
One square perch of the three-foot rows weighed, - -	244
Superiority, - -	34

N. B. The perch of the three-foot rows was not near so good as what had been drawn for the sheep before this experiment was made.

### *Experiment, No. 51.*

*Culture, expences, and produce, of one  
acre of drilled turnips.*

1770.

#### *Culture.*

The soil of this acre is a rich, deep black mould: it was summer fallowed in 1769, when it received two earths. In *May* it was ploughed again, and well harrowed: in *June* another earth was given, and fresh harrowing. It was then manured with nine loads an acre of fresh yard dung which was ploughed in, and the land again

again harrowed. It was then drilled with turnips, in rows equally distant, two feet asunder, and twice hand-hoed. These are to be transplanted, to stand for feed: they are to be planted in equidistant rows, three feet and an half asunder, and are to be at two feet distance in the rows.

*Expences.*

1769.	Two ploughings,	o	12	o	
1770.	Third earth,	-	o	6	o
	Harrowing,	-	o	1	o
	Fourth earth,	-	o	4	6
	Harrowing,	-	o	1	o
	Manuring,	-	2	14	o
	Fifth earth,	-	o	4	6
	Harrowing,	-	o	1	o
	Drilling,	-	o	2	o
	Seed,	-	o	o	6
	Twice hand-hoeing,		o	10	o
	Rent, &c.	-	2	4	o
	Total,	-	<u>7</u>	<u>o</u>	<u>6</u>

*Observations.*

The experiment, No. 50, shews the great advantage of horse-hoeing turnips, which could not be performed in the eight-

teen-inch rows without danger of burying the plants; but Mr. *Arbutnot* is of opinion, that two-feet rows will admit of sufficient culture with the horse-hoe, and produce a larger crop than in rows at three feet distance.

#### PREVENTING THE FLY.

Mr. *Arbutnot* has tried various receipts to destroy the turnip fly; but none of them have answered, except the following.

He collects all sorts of green weeds from hedges, hedge-rows, &c. mixes them with straw, and lays them on heaps on the windward side of the field: they are then set on fire, so that the wind may blow the smoak over the whole field. But it should be observed, that the weeds must not be withered too much, as it is the smothering of the flame that produces the smoak, which is expected to have the desired effect. This drives away the fly at once, and saves the crop: he this year preserved ten acres, on which the fly had begun, by pursuing this method: they were safe in three or four days. This hint he received from Mr. *Booth*, of *Glendon*, in *Northamptonshire*.

## CABBAGES.

*Experiment, No. 52.**Culture, expences, and produce, of four acres of cabbages.*

1769.

*Culture.*

The soil a sandy loam, on brick earth. In 1768 it yielded barley, the stubble of which was ploughed up the 12th of September, 14 inches deep, with the great wheel plough, and twice harrowed. It was then planted with various sorts of gardeners cabbages: the rows equally distant, at 18 inches and two feet, and the plants one foot asunder in the rows: they were once hand-hoed: three acres were fed off with ewes and lambs: they maintained 270 ewes, and 70 lambs, a fortnight, in April and May, at 3*d.* a week. J. B. A very mild winter from Michaelmas to Christmas. The other acre was sold to Covent-Garden by the bunch; from six to twelve in a bunch, at 3*d.* At two feet by one, there are 21780 plants on an acre, which, at ten for 3*d.* come to 7*l.* 4*s.* 6*d.*

I

*Expences*

*Expences.*

Ploughing,	-	£. 0 14
Harrowing,	-	0 1
Planting,	-	0 12
Seed, and feed-bed, &c.	-	0 7
Hand-hoeing,	-	0 7
Water-furrowing,	-	0 0
Rent, &c.	-	1 2
Total,	-	<u>3 3</u>

*Produce.*

Keeping 350 sheep, at 3d. is		
8l. 15s. 8d. or per acre,		<u>2 18</u>
Loss,	-	<u>0 5</u>

*Experiment, No. 53.*

*Culture, expences, and produce of a row  
of cabbages.*

1770.

*Culture.*

The soil strong loam on clay, fallow  
in 1769; manured with twelve loads a  
acre of yard dung; in *October* ridged in  
four feet lands; harrowed the beginning  
of *May*, and the 8th planted, two rows  
equally distant, one foot from plant  
plant. They have been twice hand-hoe,  
once with shim, and once with the double  
mould-board plough.

*Expences.*

1769.	Three ploughings,	£. 1	2	6
1770.	Manuring, -	3	12	0
	Harrowing, -	0	1	0
	Fourth ploughing,	0	6	0
	Harrowing, -	0	1	0
	Planting, -	0	5	0
	Two hand-hoeings,	0	7	0
	Shim, -	0	0	8
	Doublemould-board plough	0	1	2
	Rent, &c. -	2	4	0
	Total, - -	<hr/>		
		8	0	4
		<hr/>		

*Experiment, No. 54.*

*Culture and expences of a rood of cabbages.*

1770.

*Culture.*

The proportion and management of this rood the same as the preceding, only it was drilled when the ridges of the other were planted; the great *Scotch* cabbage seed, double rows on each ridge. Some rows planted. Other lands were at the same time drilled with a cabbage from *Northamptonshire*: a sugar-loaf sort, soft, and of a pale

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a pale green. *May* 29, hand-hoed, but did not set them out. *June* 6, the plants were pricked out from the drills, leaving the remainder two feet apart: then all were hand-hoed. *June* 28, the drilled beds were horse-hoed, and the furrows struck with double mould-board plough. *July* 16, the plants that were pricked out were transplanted for good. *August* 2, the transplanted were hand and horse-hoed, and the drills the same. The 24th, both were horse-hoed, and earthed up, with double mould-board plough. *November*

5, the best *Scotch* was picked out of the drilled: he weighed, - - - 20  $\frac{1}{2}$  lb

A *Northampton* ditto, - - - 13  $\frac{1}{2}$

A *Scotch* transplanted, - - - 10  $\frac{1}{2}$

A *Northampton* ditto, - - - 8

The drilled being in a distant field, many were stolen: they were therefore obliged to be consumed: it could not therefore be known how long they would stand the winter.

The *Northampton* sort much the forwardest: a proof that they will not last so well,

*Expences*



*Expences.*

1769.	Three ploughings,	£. 3	12	0
	Harrowing, -	0	1	0
	Fourth ploughing,	0	6	0
	Harrowing, -	0	1	0
	Drilling, -	0	1	0
	Seed, - -	0	2	0
	Thrice hand-hoeing,	0	10	0
	Shim, - -	0	1	4
	Double mould-board,	0	2	4
	Rent, &c.	2	4	0
	Total, -	<hr/>		
		7	0	8

*Experiment, No. 55.*

*Culture and expences of three roods of cabbages.*

1770.

*Culture.*

The land a rich turnip soil. In 1769, it yielded madder, which was taken up in the spring of 1770, ploughed in *April*, and harrowed; then drew furrows four feet afunder, in which madder was planted, on a dressing of rabbit dung, 60 sacks *per* acre. The beginning of *June* it was taken up again, the plants being wanted for another place: the 16th of *July*, *Scotch* and *North-*

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*Northamptonshire* cabbage-plants were set in the furrows after being new drawn; the rows four feet by two from plant to plant they have been horse-hoed with the shim thrice, and with the double mould-board twice, besides two hand-hoeings: the last was for drawing in the earth, after the double mould-board, to the plants.

### *Expences.*

First ploughing,	-	£. 0 7
Harrowing,	-	0 1
Manuring,	-	3 10
Drawing furrows,	-	0 0
Planting,	-	0 5
Shim thrice,	-	0 2
Double mould-board twice,		0 2
Two hand-hoeings,	-	0 6
Rent, &c.	-	1 2
Total,	-	<u>5 15 10</u>

### *Experiment, No. 56.*

*Culture and expences of one acre of cabbages.*

1770.

*Culture.*

The soil a deep black mould, fallowed in 1769, being ploughed five times; again

in *April*, 1770, when it was also ox-harrowed four times in a place; stirred again in *May*, and again harrowed; another ploughing in *June*, and two harrowings; manured with nine loads an acre of yard dung; ploughed it in, and harrowed again; struck the furrows, and planted with cabbages three feet by two. They have been twice hand-hoed, and shimmied once.

*Expences.*

1769.	Five earths,	-	£. 1	10	0
1770.	Sixth ditto,	-	0	6	0
	Harrowing,	-	0	4	0
	Seventh earth,	-	0	6	0
	Harrowing,	-	0	4	0
	Eighth earth,	-	0	5	0
	Harrowing,	-	0	1	0
	Manuring,	-	2	15	6
	Ninth earth,	-	0	5	0
	Harrowing,	-	0	1	0
	Striking furrows,		0	1	6
	Planting,	-	0	8	0
	Hand-hoeing,	-	0	6	0
	Shim,	-	0	0	8
	Rent, &c.	-	2	4	0
	Total,	£	8	17	8

## BARLEY.

*Experiment, No. 57.**Culture, expences, and produce of four acres and a half of drilled barley.*

1767.

*Culture.*

The soil of this field is a very strong clayey loam: it was cropped with wheat in 1766, the stubble of which was ploughed up at *Michaelmas*. In *April* it was slit down and harrowed, after which it was landed up in four-foot ridges, and drilled double rows, at fourteen inches, on each ridge; one bushel and a half of seed *per* acre. It was twice horse-hoed with shim, and thrice with the double mould-board plough. The product two quarters and a half *per* acre.

*Expences.*

First ploughing,	-	£. 0	8	6
Second ditto,	-	0	6	0
Harrowing,	-	0	1	0
Third ploughing,	-	0	4	6
Drilling,	-	0	1	6
Seed,	-	0	4	6
			<hr/>	
Carry over,	-	1	6	0

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Brought over,	-	£. 1	6	0
Shim twice,	-	0	1	4
Double mould-board thrice,	-	0	3	6
Reaping,	-	0	5	0
Harvesting,	-	0	3	6
Thrashing,	-	0	4	2
Rent, &c.	-	1	2	0
Carrying out,	-	0	0	6
Total,		=	3	7
			0	

### *Produce.*

Two quarters and a half, at 26s.	-	3	5	0
straw, one load,	-	0	16	0
Total,		=	4	1
			0	
Expences,	-	3	7	0
			0	14
			0	14

### *Experiment, No. 58.*

*Culture, expences, and produce of two acres.*

1767.

#### *Culture.*

The soil a strong loam; yielded oats in 1766; the stubble ploughed in lands in autumn; in the spring the lands were sowed, and one acre drilled, double rows,

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rows, on three-foot ridges, using one bushel of seed; the other acre was sown broad-cast, three bushels *per* acre; the drilled was once hand-hoed, once weeded, and horse-hoed twice, with shim, and as often with double mould-board. Product of the broad-cast twelve bushels; of the drilled ten.

### *Account of the broad-cast.*

#### *Expences.*

First ploughing,	-	£. 0 10
Water-furrowing,	-	0 1
Second earth,	=	0 7
Sowing,	=	0 0
Seed,	=	0 9
Mowing,	-	0 2
Harvesting,	-	0 4
Thraffing,	-	0 2
Carrying out,	=	0 1
Rent,	-	1 2
<b>Total,</b>	-	<hr/> 2 19 <hr/>

#### *Produce.*

Twelve bushels, at 30 s.		£. 2 5
Straw, one load,	=	0 16
<b>Total,</b>	=	<hr/> 3 1 <hr/>
Expences,	=	2 19
<b>Profit,</b>	=	<hr/> 0 2 <hr/>

# THROUGH ENGLAND. 403

*Account of the drilled.*

*Expences.*

First and second earth, and water-				
farrowing,	-	£. 0	18	6
Drilling,	-	0	1	6
Seed,	-	0	3	0
Land-hoeing,	-	0	4	0
Weeding,	-	0	4	0
him twice,	-	0	1	4
Double mould-board ditto,	-	0	2	4
Reaping,	-	0	4	0
Harvesting,	-	0	3	0
Threshing,	-	0	1	10
Carrying out,	-	0	0	10
Went,	-	1	2	0
		<hr/>		
Total,	-	3	6	4
		<hr/>		

*Produce.*

Bushels,	-	1	17	6
Draw $\frac{3}{4}$ load,	-	0	12	0
		<hr/>		
Total,	-	2	9	6
		<hr/>		
Expences,	-	3	6	4
Produce,	-	2	9	6
		<hr/>		
Loss,	-	0	16	10
Profit by broad-cast,	-	0	2	0
Superiority,	-	0	18	10
		<hr/>		

D d 2

*Observations.*

This is a very fair comparison of the two methods in the culture of barley, and the result clearly decisive in favour of the broad-cast; but the extreme poverty of the produce not exceeding 12 bushels an acre which for barley is a paltry crop, shew that drilling at these distances will by no means answer. Instead of 12, the common husbandry ought to have yielded three times 12 bushels. If barley is drilled, certainly must be in very close rows, or cannot answer. This crop was in the proportion of single rows at 18 inches, width perhaps sufficient for beans. The profit of No. 58, at a wider distance, is somewhat an exception to this remark; but 14s. an acre bears no proportion to the advantage of a good broad-cast crop.

*Experiment, No. 60.*

*Culture, expences and produce, of five acres of drilled barley.*

1767.

*Culture.*

The soil a strong loam on clay; summer fallowed in 1766, receiving five ploughings. In April, 1767, stirred again, and after twice harrowing, drilled with  
barley



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barley, double rows, at 14 inches, on 5 ½ feet lands, using one bushel of seed *per* acre. It was once hand-hoed, once weeded, and horse-hoed with shim and double mould-board four times; product two quarters an acre.

*Expences.*

1766.	Five earths,	-	£. 1	17	6
1767.	Sixth,	-	0	7	6
	Harrowing,	-	0	1	0
	Drilling,	-	0	1	6
	Seed,	-	0	3	0
	Water-furrowing,		0	0	6
	Hand-hoeing,	-	0	5	0
	Weeding,	-	0	5	0
	Shim four times,	-	0	2	8
	Double mould-board ditto,		0	4	8
	Reaping,	-	0	5	0
	Harvesting,	-	0	3	0
	Thrashing,	-	0	3	0
	Carrying out,	-	0	1	0
	Rent,	-	2	4	0
			<hr/>		
	Total,	-	6	4	4
			<hr/>		

*Produce.*

2	Quarters, at 32s.	-	3	4	0
Straw	3 quarters of a load,		0	12	0
	Total,	-	<hr/>		
			3	16	0
			<hr/>		

D d 3

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Expences,	-	-	£. 6	4	4
Produce,	-	-	3	16	0
			<hr/>		
Loss,	-	-	2	8	4
			<hr/>		

*Observations.*

Every person must be sensible, that such excellent tillage as this field received, would, in the broad-cast method, have yielded a very considerable crop of barley; but all these advantages are unable to do it with drilling at wide intervals. It is sufficiently evident, that this mode of culture is improper for barley, unless the rows are very near each other. Mr. *Arbuthnot* concludes from these trials, that barley must be excluded from the list of drill crops, unless in very narrow intervals, which will just admit the hand-hoe.

## P O T A T O E S.

*Experiment, No. 61.*

*Culture, expences and produce, of three roods of potatoes.*

1769.

*Culture.*

The soil a strong loam on clay; yielded beans in 1768, on land  $3\frac{1}{2}$  feet wide. Slit them

them down in *October* very deep; the end of *March* ploughed them back again, and harrowed and dunged the furrows with 15 loads an acre of yard dung. The land would have been planted early, but Mr. *Arbutnot* could not get the *Howard* potatoe till the beginning of *May*: he then had a sack of them from Mr. *Howard* of *Greystock*. The sets were laid on the dung, one row in a furrow, and one foot asunder; covered them with the double plough, turning a furrow from each side the land, which was suffered to remain till the shoots appeared. When a few inches above ground, the land was ploughed down to them, which was repeated till the centers of the old ridges became the furrows. After this they were once hand-hoed, horse-hoed thrice with the shim, and thrice with the double mould-board plough. In *October* they were dug up with prongs; product 102 bushels, each 80lb. Many of them were very large, and the size in general improved: They were sent to *Covent-Garden* and other markets; but nobody would purchase them. It was asserted, that the sort had been tried, and they would not boil well. Some were

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however sold at last for sets, the rest given to cows and hogs: the cows had them instead of hay, and eat them very greedily. Porkers were fattened on some, boiled and mashed, with a little barley meal mixed. In stating the proportions *per* acre, I shall suppose a value for feeding cattle; for instance, 2s. 6d. a bushel.

*Expences.*

First ploughing,	-	-	£. 0	8	6
Second ditto,	-	-	0	4	6
Harrowing,	-	-	0	1	0
Manuring,	-	-	4	10	0
Five bushels sets,	-	-	0	12	6
Slicing and planting,	-	-	0	5	0
Covering,	-	-	0	2	6
Earthing twice,	-	-	0	5	0
Hand-hoeing,	-	-	0	4	0
Shim thrice,	-	-	0	2	0
Double mould-board ditto,	-	-	0	3	6
Digging up,	-	-	0	8	0
Carting home, &c.	-	-	0	5	0
			<hr/>		
Total,	-	-	7	11	6
Rent, &c.	-	-	1	2	0
			<hr/>		
			8	13	6
			<hr/>		

THROUGH ENGLAND. 409

*Produce.*

136 Bushels, at 2s. 6d.	-	£. 17	0	0
Expences,	-	8	13	6
		<hr/>		
Profit,	-	8	6	6
		<hr/>		

*Observations.*

There can be little doubt but potatoes are worth 2s. 6d. a bushel, of 80lb. for feeding cattle; and at that rate, the profit of this experiment is very considerable. The expences run high from the manuring and such repeated cleaning; which are circumstances very advantageous to the succeeding crops; and yet the balance is 8l. 6s. 6d.; far more than could have been gained by any corn crop. But there is another circumstance much worthy of noting, which is, the crop being planted so late as *May*; a season utterly improper for planting potatoes: this was undoubtedly a great drawback from the product, which from an earlier planting would certainly have been more considerable. As to the root not being so marketable as other sorts, (supposing it true) I esteem it a matter of small consequence: the great object in cultivating potatoes is not *Covent Garden*, but the food of cattle: the first is very confined, but the latter is universal,

## V. EXPERIMENTS TO ASCERTAIN THE BEST COURSE OF CROPS.

In the range of experimental husbandry, there is nothing demands greater attention than the course of crops: the adapting a proper succession to each soil, is the great object of rural œconomics. It is of very little consequence to be able to cultivate any crop singly, ever so well, unless it unites properly with others to form a course beneficial upon the whole. When many fields have been cropped extremely different, and registers kept of them; there must appear from a general view, strong reasons for concluding some courses much more beneficial than others.

To assert that the arranging of crops must be a matter of chance, accident, or caprice, would be absolutely absurd: It is true, no man can say, I will, in spite of seasons, sow a field with such or such grain; but in thirty nine instances out of forty, he has it in his power to chuse. A field is sowing with barley—shall I throw in clover, or let it alone? A field has yielded wheat; shall I take a crop of barley, or

turnips? If a man knows not which course is most advantageous, what egregious blunders will he commit? We see these blunders committed every day through whole counties; and all for a want of possessing the requisite knowledge in this material point. They who sow four or five successive crops of white corn, know not this part of husbandry; but surely we may assert that there are fixed and determined courses, not a little worthy the attention of such men; instead of supposing that the whole is a matter in which farmers will necessarily judge right.

The method here pursued, is to state the crops yielded by certain fields; and after striking a balance of profit and loss, to compare them together, to discover which fields have been most profitable, and in what degree owing to variations of crops.

*Experiment, No. 62.*

Course—Grass ploughed for

- |                 |           |
|-----------------|-----------|
| 1. Pease        | 3. Fallow |
| 2. Winter tares | 4. Wheat. |

Three acres: the soil a strong loam on clay.

## 412 THE FARMER'S TOUR

1767.

Ploughed up the lay for pease; the crop  
10 bushels an acre.

		<i>Expences.</i>		
Ploughing,	- -	£.0	8	6
3 Bushels feed,	- -	0	9	0
Sowing,	- -	0	0	3
Harrowing,	- -	0	1	6
Water-furrowing,	- -	0	1	0
Topping thistles,	- -	0	0	6
Cutting,	- -	0	3	0
Harvesting,	- -	0	2	0
Thrashing 10 bushels,	- -	0	3	4
Rent, &c.	- -	1	2	0
		<hr/>		
		2	11	1

		<i>Produce.</i>		
10 Bushels, at 30s.	£.1	17	6	
Straw,	- -	0	12	0
		<hr/>		
		2	9	6
		<hr/>		
Loss,	- -	0	1	7
		<hr/>		

1768.

Sowed winter tares; eaten by horses in  
foiling in the stable; began in *June*: the  
three acres kept 10 horses 6 weeks, at 7s.  
*per horse per week*; which 7s. was calcu-  
lated by the saving in oats and hay.



THROUGH ENGLAND. 413

1 Bushel of oats,	-	£. 0	2	6
3 ½ Trufs of hay,	-	0	4	8
			<hr/>	
		0	7	2
			<hr/>	

*Expences.*

Ploughing with 4 horses,	-	0	9	0
Sowing,	-	0	0	3
Seed, 2 bushels,	-	0	10	0
Harrowing,	-	0	1	6
Striking furrows,	-	0	0	9
Water-furrowing,	-	0	1	0
Mowing and carrying. <i>N. B.</i> This was done by the carter, therefore cost nothing; but as he might be employed about other work, where the food dry meat, I charge	-	0	5	0
Rent,	-	1	2	0
			<hr/>	
		2	9	6
			<hr/>	

*Produce.*

Keeping 10 horses 6 weeks, at 7s. — 21l. the three acres, or <i>per</i> acre,	-	7	0	0
Expences,	-	2	9	6
			<hr/>	
Profit,	-	4	10	6
			<hr/>	

## 414 THE FARMER'S TOUR

1769.

It was then intended for wheat, but the black bent came so thick after ploughing, that it was ridged up for some other crop. From the middle of *April* till *June*, the black bent was fed with sheep, by lodging them in it from a common. After this it was fallowed, and in *October* sown with wheat; the crop 4 quarters an acre.

*Expences.*

First ploughing,	-	-	0	7	6
Harrowing,	-	-	0	1	0
Landing up with double mould-					
board plough,	-	-	0	2	1
Water-furrows,	-		0	1	0
Second ploughing 12 inches deep,			0	12	0
Third, hunting down,	-		0	7	6
Fourth, cross ploughing,	-		0	9	0
Ox-harrowing twice,	-		0	2	0
Fifth ploughing,	-	-	0	7	6
Landing up the sixth,	-		0	3	9
2 Bushels seed,	-	-	0	12	0
Sowing,	-	-	0	3	0
Sixth earth ploughing,	-		0	3	9
Water-furrowing,	-		0	1	0
Reaping,	-	-	0	10	0
Harvesting,	-	-	0	3	6
Carry over,	-		4	6	7

# THROUGH ENGLAND. 415

Brought over,	-		£.4	6	7
Thrashing, at 3s. 4d.	-		0	12	4
Carrying out,	-	-	0	2	0
Rent,	-	-	2	4	0
			7 4 11		

## *Produce.*

4 Quarters, at 5s. 6d.	-		10	10	0
Straw, 2 loads, at 21s.	-		2	2	0
			12 12 0		
Expences,	-	-	7	4	11
			5 7 1		

## *Recapitulation.*

1768.	Winter tares : profit,	-		4	10	6
1769.	Fallow,	-				
1770.	Wheat ditto,	-		5	7	1
			9 17 7			
1767.	Pease : loss,	-		0	1	7
			9 16 0			
			2 9 0			

## *Observations.*

This course is by no means an advantageous one. The pea crop not advisable by  
any

## 416 THE FARMER'S TOUR

any means. Had oats been harrowed in, probably the balance would have been a considerable profit instead of loss; and the fallow year, in all probability, might have yielded a profitable crop of beans, succeeded by wheat; but this is uncertain. However, the profit of 2*l.* 9*s.* an acre clear, is by no means to be despised. It much exceeds what the farmers in general make.

### *Experiment, No. 63.*

Course—1. Fallow                      3. Wheat  
          2. Spring tares            4. Oats.

Three acres: soil, a strong loam on clay, but not deep.

1767.

Fallowed for spring tares; the crop mown and given to sheep in a pen. The three acres kept 80 ewes a month, at 2*d.* a week. During which time they made 20 loads of dung from 2 loads of straw.

### *Expences.*

Two ploughings, . . . . .	£. 0	9	0
Third ditto, . . . . .	0	9	0
Part of it 12 inches deep.			
Landing it up into 3 bout lands,	0	7	6
Water-furrowing, . . . . .	0	1	0
Gathering 2 into one in <i>May</i> ,	0	7	6
		<hr/>	
Carry over,	1	14	0

THROUGH ENGLAND. 417

Brought over,	-	-	£.1	14	0
sowing,	-	-	0	0	3
Bushels of tares,	-	-	0	9	0
harrowing,	-	-	0	1	6
striking furrows,	-	-	0	0	9
Mowing and giving the sheep, &c.	0	5	0		
rent, &c.	-	-	2	4	0
			<hr/>		
			4	14	6

*Produce.*

keeping 80 Sheep 4. weeks, at 2d. a sheep, 2l. 13s. 4d. the third of which is,	-	-	0	17	9
			<hr/>		
Loss,	-	-	3	16	9
			<hr/>		

1769.

After the tares wheat was sown; the  
product 2 quarters *per* acre.

*Expences.*

ploughing,	-	-	£.0	7	6
harrowing,	-	-	0	1	6
Seed, 2 bushels	-	-	0	11	0
sowing,	-	-	0	0	3
6 Sacks <i>per</i> acre of rabbit dung, and sowing,	-	-	0	19	0
Carriage ditto,	-	-	0	2	6
striking furrows,	-	-	0	0	9
Carry over,	-	-	2	2	6

# 418 THE FARMER'S TOUR

Brought over,	-	-	£.2	2	6
Water-furrowing,	-	-	0	1	0
Weeding,	-	-	0	6	0
Reaping,	-	-	0	8	0
Harvesting,	-	-	0	3	6
Thrashing,	-	-	0	6	0
Carrying out,	-	-	0	1	0
Rent, &c.	-	-	1	2	0
			<hr/>		
			4	10	0

## Produce.

2 Quarters, at 44 s.	-	-	4	8	0
Straw, 1 ½ load,	-	-	1	10	0
			<hr/>		
			5	18	0
Expences,	-	-	4	10	0
			<hr/>		
Profit,	-	-	1	8	0

## 1770.

Ploughing,	-	-	0	5	0
Harrowing,	-	-	0	1	0
3 Bushels oats,	-	-	0	8	0
Sowing,	-	-	0	0	0
Striking furrows with double mould-board plough,	-	-	0	1	0
Water-furrowing,	-	-	0	1	0
Mowing,	-	-	0	1	0
			<hr/>		
Carry over,	-	-	0	19	0

# THROUGH ENGLAND. 419

Brought over,	-	-	£. 0	19	1
Harvesting,	-	-	0	4	6
Thrashing,	-	-	0	4	6
Rent,	-	-	1	2	0
Total,			2	10	1

## *Produce.*

3 Quarters of oats,	-	-	3	0	0
Straw 1 ½ load,	-	-	1	10	0
Total,			4	10	0
Expences,	-	-	2	10	1
Profit,			1	19	11

## *Recapitulation.*

1768. Tares, loss,	-	-	3	16	9
1769. Wheat, profit, £.	1	8	0		
1770. Oats ditto,	1	19	11		
			3	7	11
Loss,			0	8	10
Or <i>per annum</i> ,			0	2	2

## *Observations.*

This course is as disadvantageous, as can well be imagined. To give a complete fallow for a crop of spring tares, is what no person would willingly do, unless he fore-

420 THE FARMER'S TOUR

fees a great want of food for his stock: this occasioned the first loss, and a poor crop of wheat succeeding, rendered the whole uncommonly disadvantageous. The principal profit here, is reaped from sowing oats after wheat; bad husbandry in general, but clover was sown with this wheat, which miscarried, and that was the reason of sowing the oats.

*Experiment, No. 64.*

*Course.*

- |           |           |
|-----------|-----------|
| 1. Barley | 3. Clover |
| 2. Clover | 4. Wheat. |

—Three acres; the soil a strong loam on clay.

1767.

Sown with barley; the produce 2 quarters and a half *per* acre.

*Expences.*

First ploughing, 12 inches deep in winter, 1766, -	£. 0 12 0
Slitting down in <i>April</i> , -	0 7 6
Two bushels barley, -	0 6 0
Sowing, -	0 0 3
Harrowing, -	0 1 6
Striking furrows, -	0 0 9
Water-furrowing, -	0 1 0
Carry over, -	1 9 0



# THROUGH ENGLAND. 421

Brought over, - -	£.	1	9	0
Mowing, - - -		0	1	6
Harvesting, - - -		0	4	6
Threshing, - - -		0	4	6
Carrying out, - - -		0	2	6
Rent, - - -		1	2	0
<hr style="width: 100%;"/>				
Total, - - -		3	4	0

## *Produce.*

2 $\frac{1}{2}$ quarters, at 30s. - -		3	15	0
Straw one load, - - -		1	0	0
<hr style="width: 100%;"/>				
Total, - - -		4	15	0
Expences, - - -		3	4	0
Profit, - - -		1	11	0

1768.

Clover was sown with the barley; it was mown twice for hay, and yielded 3  $\frac{1}{2}$  loads: the first mowing the 10th of *June*, to cut off the black bent, that it might not shed: the second was the beginning of *August*.

## *Expences.*

10 lb. Seed clover, - - -		0	3	4
Sowing, - - -		0	0	3
Manuring in <i>January</i> 12 loads an acre yard dung and coal ashes, at 7s. - - -		4	4	0
<hr style="width: 100%;"/>				
Carry over, - - -		4	7	7

## 422 THE FARMER'S TOUR

Brought over,	-		£.	4	7	7
Spreading,	-	-	0	1	6	
Mowing twice,	-	-	0	4	9	
Making twice,	-	-	0	12	0	
Carting and stacking ditto,	-	-	0	10	0	
Rent,	-	-	1	2	0	
Total,	-	-	6	17	10	

### *Produce.*

3 $\frac{1}{2}$ Loads, at 3 <i>l.</i>	-		10	10	0
Sheep feed,	-	-	0	5	0
Total,	-	-	10	15	0
Expences,	-	-	6	17	10
Profit,	-	-	3	17	2

### 1769.

Mown once; produce 1  $\frac{1}{2}$  load.

### *Expences.*

Mowing,	-		0	2	6
Making,	-	-	0	6	0
Carting and stacking,	-	-	0	5	0
Rent,	-	-	1	2	0
Total,	-	-	1	15	6

*Produce*

# THROUGH ENGLAND. 423

## Produce.

1/2 Load hay, at 3 <i>l</i> .	-		-	£.4	10	0
After-grafs,	-	-	-	0	15	0
Total,	-	-	-	5	5	0
Expences,	-	-	-	1	15	6
Profit,	-	-	-	3	9	6

1770.

Wheat harrowed in on one trench-ploughing; produce 3 1/2 quarters *per* acre.

## Expences.

Trench-ploughing with *Ducket's*

plough in <i>September</i> ,	-		-	0	13	0
Seven pecks feed,	-	-	-	0	9	0
Sowing,	-	-	-	0	0	3
Harrowing,	-	-	-	0	3	0
Water-furrowing,	-	-	-	0	1	0
Striking furrows,	-	-	-	0	0	6
Weeding,	-	-	-	0	7	0
Reaping,	-	-	-	0	10	0
Harvesting,	-	-	-	0	4	0
Thrashing,	-	-	-	0	10	6
Carrying out,	-	-	-	0	1	9
Rent,	-	-	-	1	2	0
Total,	-	-	-	4	2	0

## 424 THE FARMER'S TOUR

### Produce.

3 $\frac{1}{2}$ quarters, at 50s.	-	£. 8 15 0
Straw, 2 loads, at 24s.		2 8 0
		<hr/>
Total,	-	11 3 0
Expences,	- -	4 2 0
		<hr/>
Profit,	- -	7 1 0
		<hr/>

### Recapitulation.

1767. Barley, profit,	-	1 11 0
1768. Clover, ditto,	-	3 17 2
1769. Ditto,	- -	3 9 6
1770. Wheat, ditto,	-	7 1 0
		<hr/>
Total,	- -	15 18 8
		<hr/>
Or <i>per ann.</i>	-	3 19 8
		<hr/>

### Observations.

This course is perfectly consistent with the best ideas of modern husbandry, and we accordingly find it very profitable: there cannot well be a stronger argument for adopting a beneficial course of crops, than the result of this. Near 4*l.* *per acre* clear profit *per ann.* shews what the soil is capable of when properly managed. The material point, which calls for a particular remark, is the leaving the clover two years

years on the land. It is here evidently most excellent husbandry, notwithstanding the black bent appeared in it so early. A clear profit of 3*l.* 9*s.* *per* acre, on the second crop is an object of no trifling magnitude; and the great produce of wheat following shews plainly, that that crop did not suffer the least from the clover lying two years instead of one.

Another point, which I shall beg leave to observe, is the success which here attends trench-ploughing the clover-lay for wheat. This is an uncommon practice; but it is evidently an excellent one: it is what the farmers are fearful of, tho' plainly without reason.

*Experiment, No. 65.*

*Course.*

- |                   |           |
|-------------------|-----------|
| 1. Tares and flax | 3. Tares  |
| 2. Fallow         | 4. Wheat. |

Six acres; the soil a good mellow loam on brick earth.

1767.

In 1766, it yielded wheat, and one half ploughed afterwards for tares: they were cut for horses, and kept eight a month. Flax was sown on the other half, which was pulled in *August*, and came to 4*l.* *per* acre.

## 426 THE FARMER'S TOUR

### *Account of the tares.*

#### *Expences.*

Ploughed 12 inches deep,	£. 0 12 0
In <i>April</i> a second earth,	- 0 7 6
2 Bushels tares,	- 0 9 0
Sowing,	- 0 0 3
Harrowing,	- 0 1 6
Mowing and carting,	- 0 5 0
Rent,	- 1 2 0
	<hr/>
Total,	2 17 3

#### *Produce.*

Keeping 8 horses a month, at 7s.

11l. 4s. the 3d of which is	3 14 8
Expences, - - -	2 17 3
	<hr/>
Profit, - - -	0 17 5

### *Account of the flax.*

#### *Expences.*

Ploughing,	- - -	0 12 0
2 Bushels flax feed,	- - -	0 9 0
Sowing,	- - -	0 0 3
Harrowing,	- - -	0 2 0
Pulling,	- - -	0 8 0
Binding and bringing home,	- - -	0 5 0
Watering,	- - -	0 3 0
		<hr/>
Carry over,	- - -	1 19 3

# THROUGH ENGLAND. 427

Brought over,	-	£.	1	19	3
Sodding and unfodding,			0	3	0
Spreading on grafs,	-		0	5	0
Turning,	-		0	2	6
Gathering, binding and carting,			0	8	0
Rent,	-		1	2	0
Total,			3 19 9		

## Produce.

Yielded <i>per</i> acre,	-		4	0	0
Expences,	-		3	19	1
Profit,			0 0 11		

1768.

Ploughing 12 inches deep in autumn,	-		0	12	0
Water-furrowing,	-		0	1	0
Hunting down in <i>May</i> ,	-		0	7	6
In <i>June</i> cross ploughing,	-		0	7	6
Fourth earth in <i>July</i> , stirring,			0	5	0
Ox-harrowed in <i>August</i> ,			0	3	0
Designed for wheat; but such a deluge of rain in <i>September</i> , that could not go on; but fur- rows were drawn in the low places,	-		0	0	6
Water-furrowing,	-		0	1	0
Carry over,			1 17 6		

428 THE FARMER'S TOUR

Brought over,	-	£. 1 17	0
In <i>May</i> trench-ploughed,		0 13	0
2 Bushels tares,	-	0 9	0
Harrowing,	- -	0 1	0
Rent,	- -	1 2	0
Total,		<hr/>	
		4 2	6

*Produce.*

Sheep fed. worth <i>per</i> acre,		0 5	0
Loss,	- -	3 17	0

1770.

Trench-ploughed it in <i>August</i> ,		0 13	0
Ox-harrowing,	- -	0 3	0
Landing up in <i>September</i> ,		0 5	0
Harrowing,	- -	0 1	0
2 Bushels wheat,	- -	0 10	6
Sowing,	- -	0 0	3
Ploughing in,	- -	0 5	0
Water-furrowing,	- -	0 1	0
15 Sacks rabbits dung,	- -	1 0	0
Sowing,	- -	0 1	6
Weeding,	- -	0 6	0
Reaping,	- -	0 8	0
Harvesting,	- -	0 3	6
Carrying,	- -	0 1	3
Thrashing,	- -	0 7	6
Rent,	- -	1 2	0
Total,		<hr/>	
		5 8	6



# THROUGH ENGLAND. 429

## *Produce.*

2 $\frac{1}{2}$ quarters, at 48s.	-		£.6	0	0
Straw, 1 $\frac{1}{2}$ load, at 25s.			1	17	6
Total,	-	-	7	17	6
Expences,	-	-	5	8	6
Profit,	-	-	2	9	0

## *Recapitulation.*

1768,9. Tares, losfs,	-		3	17	0
1767. Tares, profit, £.	0	17	5		
1770. Wheat, ditto,		2	9	0	
			3	6	5

Losfs, - - - 0 10 7

Or *per ann.* - - - 0 2 7

1768,9. Tares, losfs,	-		3	17	0
1767. Flax, profit,	0	0	11		
1770. Wheat, ditto,		2	9	0	
			2	9	11

Losfs, - - - 1 7 1

Or *per ann.* - - - 0 6 9

## *Observations.*

An unfortunate season in preventing the wheat sowing, rendered this course almost

## 430 THE FARMER'S TOUR

as bad a one as could have happened. Tares here paid nothing for an extraordinary expence bestowed on them. Had beans been sown instead of the second crop of tares, the account would have been very different.

Flax answers very badly in this trial: the crop is not large, but the expences run very high. It is here however to be observed, that this field is excessive poor, and had not received a load of dung of 20 years

### *Experiment, No. 66.*

#### *Course.*

- |          |           |
|----------|-----------|
| 1. Oats  | 3. Fallow |
| 2. Pease | 4. Wheat. |

Three acres; the soil the same as No. 65, 1767.

In 1766 it yielded clover, ploughed up and harrowed in oats; the crop  $4\frac{1}{2}$  quarters an acre.

#### *Expences.*

Ploughing,	-	-	£. 0	9	0
3 Bushels oats,	-	-	0	6	9
Harrowing,	-	-	0	1	6
Water-furrowing,	-	-	0	1	0
Mowing,	-	-	0	1	8
Harvesting,	-	-	0	4	6

---

Carry over, 1 4 5

THROUGH ENGLAND. 431

Brought over,	£. 1	4	5
Thrashing, - - -	0	6	9
Rent, - - - -	1	2	0
	<hr/>		
Total, - - -	2	13	2
	<hr/>		

*Produce,*

4 $\frac{1}{2}$ Quarters, at 17s.	-	3	16	6
Straw 1 $\frac{1}{2}$ load, at 16s.	-	1	4	0
	<hr/>			
Total, - - -	-	5	0	6
Expences, - - -	-	2	13	2
	<hr/>			
Profit, - - -	-	2	7	4
	<hr/>			

1768.

Ploughed up the oat stubble in

January, - - -	-	0	7	6
2 Bushels 1 peck pease, at 5s. 6d.	0	12	3	
Sowing, - - -	-	0	0	3
Harrowing in in February,	0	1	6	
Also 10 sacks kiln dust,	-	1	0	0
Carriage of ditto, - - -	-	0	2	6
Sowing, - - -	-	0	1	6
Striking furrows, - - -	-	0	0	9
Topping thistles, - - -	-	0	0	4
Cutting, - - -	-	0	1	8
Harvesting, - - -	-	0	3	0
Thrashing, - - -	-	0	3	0
	<hr/>			
Carry over, - - -	-	2	14	3

## 432 THE FARMER'S TOUR

Brought over,	-		£.2	14	3
Carrying out,	-	-	0	0	9
Rent,	-	-	1	2	0
Total,	-	-	3	17	6

### Produce.

12 Bushels, at 36s.		£.2	14	0	
Straw, 3 quarters load,		0	15	0	
			3	9	0

Loss,	-	-	0	8	6
-------	---	---	---	---	---

1769.

Ploughed in autumn,	-		0	7	6
Water-furrowed,	-	-	0	1	0
In the spring the black bent came thick; it was fed by sheep till the middle of <i>May</i> , then hunted down,					
	-	-	0	5	0
Cross ploughing,	-	-	0	7	6
Stirring,	-	-	0	5	0
Ox-harrowing,	-	-	0	3	0
Landing up in <i>August</i> ,	-	-	0	5	0
2 Bushels wheat,	-	-	0	11	0
Sowing in <i>October</i> ,	-	-	0	0	3
Harrowing,	-	-	0	0	6
Water-furrowing,	-	-	0	1	0
In <i>February</i> 15 facks of rabbit dung,					
	-	-	1	0	0
Carry over,	-	-	3	6	9

# THROUGH ENGLAND. 433

Brought over,	-	-	£. 3	6	9
Sowing,	-	-	0	1	6
Reaping,	-	-	0	8	0
Harvesting,	-	-	0	4	0
Thrashing,	-	-	0	10	6
Carrying out,	-	-	0	1	9
Rent,	-	-	2	4	0
Total,	-	-	6	16	6

## *Produce.*

½ quarters, at 48 s.	-	-	8	8	0
straw 2 loads, at 25 s.	-	-	2	10	0
Total,	-	-	10	18	0
Expences,	-	-	6	16	6
Profit,	-	-	4	1	6

## *Recapitulation.*

767. Oats, profit,	-	-	2	7	4
770. Wheat ditto,	-	-	4	1	6
Total,	-	-	6	8	10
768. Pease, loss,	-	-	0	8	6
Profit,	-	-	6	0	4
Or per ann.	-	-	1	10	1

## *Observations.*

A pea crop to prove unprofitable is not uncommon; but to be necessitated to succeed

ceed it with a fallow, was a circumstance that could not fail of making this course indifferent; yet the profit amounts to 1*l.* 10*s.* *per acre per ann.* which is vastly more than one would at first sight imagine indeed it is so much, that it is difficult to allow the course to be so bad as it appears. Probably it would have proved more advantageous, had not the whole field been pestered with the running sow-thistle, an extreme bad weed.

*Experiment, No. 67.*

*Course.*

1. Beans.            2. Wheat.            3. Tares.

One acre and three roods; the soil a strong yellow loam on brick earth. In 1766 was a very bad old weedy lay.

1767.

Dibbled with beans; the product five and a half quarters an acre.

*Expences.*

Ploughing in <i>January</i> ,	-	£. 0 11
Harrowing,	-	0 1
Dibbling,	-	0 5
2 $\frac{1}{4}$ Bushels tick beans,	-	0 8
Harrowing,	-	0 1
Striking furrows,	-	0 0
Twice hand-hoeing,	-	1 0
		<hr/>
Carry over,	-	2 8

THROUGH ENGLAND. 435

Brought over,	-	-	£. 2	8	0
opping,	-	-	0	0	6
leaping,	-	-	0	8	0
harvesting,	-	-	0	3	6
hrashing,	-	-	0	6	5
ent, &c.	-	-	1	2	0
			<hr/>		
Total,	-	-	4	8	5
			<hr/>		

*Produce.*

½ quarters, at 25s.	-	-	6	17	6
Draw 2 loads, at 25s.	-	-	2	10	0
			<hr/>		
Total,	-	-	9	7	6
Expences,	-	-	4	8	5
			<hr/>		
Profit,	-	-	4	19	1
			<hr/>		

1768.

Ploughed the stubble once, and harrowed wheat : the crop 4 quarters an acre.

*Expences.*

oughing,	-	-	0	9	0
arrowing,	-	-	0	1	6
two bushels feed,	-	-	0	12	0
owing,	-	-	0	0	3
Water-furrowing,	-	-	0	1	0
leaping,	-	-	0	9	0
harvesting,	-	-	0	3	6
hrashing,	-	-	0	12	0
arrying,	-	-	0	2	0
ent,	-	-	1	2	0
			<hr/>		
Total,	-	-	3	12	3
			<hr/>		

# 436 THE FARMER'S TOUR

## Produce.

4 Quarters, at 52s. 6d.		£.	10	10
Straw 2 loads, at 25s.	-		2	10
<hr/>				
Total,	-		13	0
Expences,	-		3	12
<hr/>				
Profit,	-		9	7
<hr/>				

1769.

Ploughed the wheat stubble once, and harrowed in winter tares; cut green for soiling horses; they kept eight four weeks

## Expences.

Ploughing,	-		0	9
Two bushels tares,	-		0	10
Sowing,	-		0	0
Harrowing,	-		0	1
Striking furrows with double mould-board plough,	-		0	1
Water-furrowing,	-		0	1
Mowing and carrying,			0	5
Rent,	-		1	2
<hr/>				
Total,	-		2	9
<hr/>				

## Produce.

The acre and $\frac{1}{4}$ kept 8 horses 4 weeks, at 7s. which is per acre,	-		6	8
Expences,	-		2	9
<hr/>				
Profit,	-		3	18
<hr/>				



1770.

Ploughed up the tare stubble in *September*, and harrowed in rye; the beginning of *March*, and in part of *April*, eat off the rye with sheep. It kept 20 couple five weeks; it was then ploughed four times, and planted in *August* with cabbages, in equally-distant rows,  $2\frac{1}{2}$  feet asunder.

*Expences.*

Ploughing,	-	-	£. 0	7	6
Two bushels rye,	-	-	0	7	0
Sowing,	-	-	0	0	3
Harrowing,	-	-	0	1	6
Striking furrows with double mould-board plough,			0	1	2
Water-furrowing,	-	-	0	1	0
Ploughing ten inches deep,			0	10	0
Cross ditto,	-	-	0	9	0
Stirring,	-	-	0	7	6
Rolling with spiky roller,			0	2	0
Manuring with night soil, 7 loads <i>per</i> acre,	-	-	3	17	0
Spreading,	-	-	0	1	3
Ox-harrowing,	-	-	0	1	0
Ploughing,	-	-	0	7	6
Spiky roller,	-	-	0	2	0
Harrowing,	-	-	0	1	0
Planting,	-	-	0	10	0
Horse-hoeing, <i>shim</i> twice,			0	1	4
Hand-hoeing once,	-	-	0	4	0
Rent,	-	-	1	2	0
Total,	-	-	<hr/>		
			8	14	0

# 438 THE FARMER'S TOUR

## Recapitulation.

1767. Beans, profit,		£. 4	19	1
1768. Wheat ditto,	-	9	7	9
1769. Tares ditto,	-	3	18	1
		<hr/>		
Total,	-	18	4	11
		<hr/>		
Average,	-	6	1	7
		<hr/>		

## Experiment, No. 68.

### Course.

- |                  |                  |
|------------------|------------------|
| 1. Drilled beans | 3. Drilled beans |
| 2. Drilled wheat | 4. Winter tares. |

Five acres; the soil good; a strong loam on clay.

1767.

This crop of drilled beans is minuted in

### Experiment, No. 38.

Product, 3 quarters, at 25s.		3	15	0
Straw,	-	1	0	0
		<hr/>		
Total,	-	4	15	0
Expences,	-	3	16	0
		<hr/>		
Profit,	-	0	18	0
		<hr/>		

1768.

This drilled wheat is that of *Experiment* No. 36.

Product, 3 quarters, 52s. 6d.		7	17	0
Straw,	-	1	5	0
		<hr/>		
		9	2	0

THROUGH ENGLAND. 439

Product,	-	-	£. 9	2	6
Expences,	-	-	5	8	11
			<hr/>		
Profit,	-	-	3	13	7
			<hr/>		

1769.

These drilled beans registered in *Experiment*, No. 40.

Produce, 3 quarters,	-	-	3	15	0
Straw,	-	-	1	5	0
			<hr/>		
Total,	-	-	5	0	0
Expences,	-	-	3	6	11
			<hr/>		
Profit,	-	-	1	13	1
			<hr/>		

1770.

In *October* the bean stubble was ploughed up with 2 horses, 8 or 9 inches deep, and 2 bushels *per* acre of winter tares harrowed in: the crop mown for foiling horses, and kept 12 two months.

*Expences.*

Ploughing,	-	-	0	5	0
Seed,	-	-	0	10	0
Sowing,	-	-	0	0	3
Harrowing,	-	-	0	1	6
Striking furrows,	-	-	1	2	0
Water-furrowing,	-	-	0	0	3
Mowing and carrying,	-	-	0	5	0
Rent, &c.	-	-	1	2	0
			<hr/>		
Total,	-	-	2	5	2
			<hr/>		

## 440 THE FARMER'S TOUR

### *Produce.*

Keeping 12 horses 8 weeks, at 7s. 6d.—36l.; the fifth is	£.	7	4	0
Expences, -		2	5	2
		<hr/>		
Profit, - -		4	18	10
		<hr/>		

### *Recapitulation.*

1767. Drilled beans, profit,		0	18	6
1768. Ditto wheat, ditto, -		3	13	7
1769. Ditto beans, ditto,		1	13	1
1770. Winter tares, ditto,		4	18	10
		<hr/>		
Total, - -		11	4	0
		<hr/>		
Which is <i>per ann.</i> -		2	16	0
		<hr/>		

### *Observations.*

Both the drill husbandry, and that of winter tares, figure very advantageously in this course, which is upon the whole unexceptionable: the vast produce of a good crop of winter tares renders them remarkably profitable.

### *Experiment, No. 69.*

#### *Course.*

- |                       |                   |
|-----------------------|-------------------|
| 1. Oats, stubble left | 3. Drilled wheat  |
| 2. Fallow             | 4. Drilled beans. |

Three acres; the soil a strong loam on clay.

1768.

In autumn, 1767, the old stubble was ploughed up, 12 inches deep, and tilled through this year, and in autumn following.

1769.

Drilled with wheat, double rows on three-foot lands, three pecks of seed *per* acre. In the spring it was manured with twenty sacks *per* acre of rabbits dung; it was hand-hoed once, weeded once, and horse-hoed twice, once with shim, and once with the double mould-board plough: the crop two quarters *per* acre.

*Expences.*

Ploughing,	-	-	£. 0	12	0
Hunting,	-	-	0	7	6
Cross ditto,	-	-	0	7	6
Stirring,	-	-	0	7	6
Ox-harrowing,	-	-	0	4	6
Landing up with double mould-board plough,	-	-	0	2	1
Drilling,	-	-	0	1	6
Seed,	-	-	0	2	6
Striking,	-	-	0	1	2
Water-furrowing,	-	-	0	1	0
Rabbit dung,	-	-	1	8	6
Hand-hoeing,	-	-	0	6	0
Shim,	-	-	0	0	8
Double mould-board plough,	-	-	0	1	2
				<hr/>	
Carry over,	-	-	4	3	7

442 THE FARMER'S TOUR

Brought over,	-	£. 4	3	7
Weeding,	-	0	6	0
Reaping,	-	0	8	0
Harvesting,	-	0	3	6
Thrashing,	-	0	6	0
Three years rent, &c.	-	3	6	0
				<hr/>
Total,	-	8	13	1

*Produce.*

2 Quarters, at 44s.	4	8	0		
Straw,	1	0	0		
				<hr/>	
		5	8	0	
Loss,	-	-	3	5	1
				<hr/>	

From this crop it is extremely evident, that the mere resting land is of no benefit without tillage; the crop could scarcely fail being unprofitable with such an accumulation of expences. It should however be remarked, that this field, when first Mr. *Arbutnot* had it, was remarkably foul and poor.

1770.

These beans are minuted in *Experiment*, No. 43.

The profit *per acre* 4*l.* 11*s.* 8*d.*

*Recapitulation.*

1770. Drilled beans, profit,	4	11	8
1769. Wheat, loss,	-	3	5
Profit,	-	1	6
Or <i>per ann.</i>	-	0	6
			<hr/>
		7	7

This field is now drilled with wheat.

*Experiment, No. 70.*

*Course.*

- |                  |                   |
|------------------|-------------------|
| 1. Fallow        | 3. Wheat          |
| 2. Drilled beans | 4. Drilled beans: |

Three acres; the soil a strong clay; taken in miserable order, quite foul and poor.

1767.

In 1766, yielded oats, the stubble of which was ploughed up in *May*, 1767, and hemp sown; but the crop miscarried: it was then landed up for the winter.

1768.

In the spring, drilled with horse-beans, kept clean by hand and horse-hoeing; the crop 3 quarters *per* acre.

*Expences.*

First ploughing,	-	£. 0	9	0
Harrowing,	-	0	1	6
Cross ploughing,	-	0	7	6
Landing up,	-	0	7	6
Water-furrowing,	-	0	1	0
Drilling,	-	0	1	6
Harrowing,	-	0	0	6
1 Bushel and a half seed,	-	0	5	3
Water-furrowing,	-	0	1	0
Hand-hoeing,	-	0	5	0
Shim,	-	0	0	8
Double mould-board plough,		0	1	2
		<hr/>		
Carry over,	=	2	1	7

## 444 THE FARMER'S TOUR

Brought over,	-	-	£.2	1	7
Ditto both again,	-	-	0	1	10
Pulling,	-	-	0	7	0
Harvesting,	-	-	0	3	0
Threshing,	-	-	0	4	6
Rent,	-	-	2	4	0
			<hr/>		
Total,	-	-	5	1	11
			<hr/>		

### Produce.

3 Quarters, at 30s.	-	-	4	10	0
1 Load straw,	-	-	1	0	0
			<hr/>		
Total,	-	-	5	10	0
Expences,	-	-	5	1	11
			<hr/>		
Profit,	-	-	0	8	1
			<hr/>		

1769.

Ploughed up the bean stubble in autumn; ploughed it again in *November*; in *January* landed up, and in *March* fowed with wheat, and with it 20 sacks an acre of rabbit dung. It was weeded; the crop 2 quarters and a half *per* acre.

### Expences.

First ploughing,	-	-	0	7	6
Second ditto,	-	-	0	7	6
Water-furrowing,	-	-	0	1	0
Two bushels seed,	-	-	0	13	0
Sowing,	-	-	0	0	3
			<hr/>		
Carry over,	-	-	1	9	3



THROUGH ENGLAND. 445

Brought over,	-	-	£. 1	9	3
Rabbit dung, &c.	-	-	1	8	2
Weeding,	-	-	0	6	0
Reaping,	-	-	0	8	0
Harvesting,	-	-	6	3	6
Thrashing,	-	-	0	3	9
Rent, &c.	-	-	1	2	0
			<hr/>		
Total,	-	-	5	0	8
			<hr/>		

*Produce.*

Two quarters and a half, at 44s.			5	10	0
Straw 1 load and a half, at 25s.			1	17	6
			<hr/>		
Total,	-	-	7	7	6
Expences,	-	-	5	0	8
			<hr/>		
Profit,	-	-	2	6	10
			<hr/>		

1770.

This crop of drilled beans is that of *Experiment, No. 42.*

Profit *per acre* 6l. 5s. 5d.

*Recapitulation.*

1767. Fallow.					
1768. Drilled beans, profit,			0	8	1
1769. Wheat ditto,	-	-	2	6	10
1770. Drilled beans ditto,			6	0	5
			<hr/>		
Total,	-	-	8	15	4
			<hr/>		
Or <i>per ann.</i>	-	-	2	3	10
			<hr/>		

# 446 THE FARMER'S TOUR

*Experiment, No. 71.*

*Course.*

- |                  |           |
|------------------|-----------|
| 1. Drilled pease | 3. Beans  |
| 2. Wheat         | 4. Wheat. |

Five acres; the soil a sandy loam.

1767.

This is the crop registered in *Experiment, No. 45.* Profit 6*s.* 8*d.*

1768.

This drilled wheat is minuted under *Experiment, No. 35.* The profit 2*l.* 8*s.* 7*d.* per acre.

1769.

Drilled beans. See *Experiment, No. 41.* Profit 2*l.* 5*s.* 7*d.*

1770.

The bean stubble ploughed directly after harvest, and after harrowing, and hunting, sown broad-cast with wheat. In *February* manured with rabbit dung. Product 2 quarters per acre.

*Expences.*

First ploughing,	-	£.	0	10	0
Harrowing,	-		0	1	0
Second ploughing,	-		0	7	6
Harrowing,	-		0	1	0
Two bushels seed,	-		0	12	6
Sowing,	-		0	0	3
			<hr/>		
Carry over,	-		1	12	3

# THROUGH ENGLAND. 447

Brought over,	-		£.	1	12	3
Ploughing in gathering up,				0	5	0
Water-furrowing,	-			0	1	0
15 Sacks rabbit dung,	-			1	1	6
Weeding,	-	-		0	5	0
Reaping,	-	-		0	8	0
Harvesting,	-			0	3	6
Thrashing,	-	-		0	6	0
Rent,	-	-		1	2	0
Total,				5	4	3

## *Produce.*

2 Quarters, at 48s.	-			4	16	0
1 Load straw,	-			1	5	0
Total,				6	11	0
Expences,				5	4	3
Profit,				0	16	9

## *Recapitulation.*

1767. Drilled pease, profit,				0	6	8
1768. Ditto wheat, ditto,				2	8	7
1769. Ditto beans, ditto,				2	5	7
1770. Wheat ditto,	-			0	16	9
Total,				5	17	7
Or <i>per ann.</i>				1	9	4

This field was also extremely foul and poor: it is now winter tares, succeeded by a bastard fallow.

# 448 THE FARMER'S TOUR

## Experiment, No. 72.

### Course.

- |                  |                 |
|------------------|-----------------|
| 1. Drilled beans | 3. Ditto beans  |
| 2. Ditto wheat   | 4. Ditto wheat. |

Eight acres registered in the *Experiments* 28, &c.

Average profit *per annum* of the four years, 3*l.* 15*s.* 2*d.*

## Experiment, No. 73.

### Course.

- |                  |                 |
|------------------|-----------------|
| 1. Fallow        | 3. Ditto wheat  |
| 2. Drilled beans | 4. Ditto beans. |

See *Experiments*, No. 32, 33, and 34.

Average profit of the 4 years, 1*l.* 1*s.* 11*d.*

## Experiment, No. 73.\*

### Course.

- |          |                  |
|----------|------------------|
| 1. Oats  | 3. Fallow        |
| 2. Tares | 4. Drilled wheat |

Seven acres and 3 quarters; the soil a strong loam on brick earth.

1767.

Yielded clover in 1766, ploughed it in spring, and harrowed in oats; the crop 4 quarters *per acre*.

### Expences.

Ploughing,	-	-	£.	0	10	0
3 Bushels oats,	-	-		0	6	9
Sowing,	-	-		0	0	3
				<hr/>		
Carry over,	-	-		0	17	0

THROUGH ENGLAND. 449

Brought over,	-	-	£. 0	17	0
Harrowing,	-	-	0	2	0
Water-furrowing,	-	-	0	1	0
Mowing,	-	-	0	2	0
Harvesting,	-	-	0	5	0
Threshing,	-	-	0	6	0
Rent,	-	-	1	2	0
<hr/>					
Total,	-	-	2	15	0
<hr/>					

*Produce.*

Quarters, at 16s.	-	-	3	4	0
Load straw,	-	-	1	12	0
<hr/>					
Total,	-	-	4	16	0
Expences,	-	-	2	15	0
<hr/>					
Profit,	-	-	2	1	0

1768.

Ploughed up in *January*, and harrowed in tares; but they nearly failed; the value not more than 8s. an acre.

Ploughing,	-	-	0	9	0
Bushels feed,	-	-	0	8	0
Harrowing,	-	-	0	2	0
Mowing,	-	-	0	0	3
Water-furrowing,	-	-	0	1	0
Rent,	-	-	1	2	0
<hr/>					
Total,	-	-	2	2	3

*Produce.*

Value of food,	-	-	0	8	0
Loss,	-	-	1	14	3
<hr/>					

450 THE FARMER'S TOUR

1770.

For this wheat, see *Experiment*, No. 37.  
Profit 4*l.* 17*s.*

*Recapitulation.*

1767. Oats, profit,	-	£. 2	1	0
1770. Wheat ditto,	-	4	17	0
<hr/>				
Total,	-	6	18	0
1768. Tares, loss,	-	1	14	3
<hr/>				
Profit,	-	5	3	9
<hr/>				
Or <i>per annum</i> ,	-	1	5	11
<hr/>				

*Experiment*, No. 74.

*Course.*

1. Oats. 2. Drilled Pease. 3. Barley.

1769.

Four acres and a half; the soil a light loam on brick earth; the crop of oats five quarters and a half.

*Expences.*

Ploughing,	-	0	10
Three bushels seed,	-	0	6
Harrowing,	-	0	2
Sowing,	-	0	0
Water-furrowing,	-	0	1
Mowing,	-	0	2
Harvesting,	-	0	5
Thrashing,	-	0	8
Rent,	-	1	2
<hr/>			
Total,	-	2	17
<hr/>			

*Produce.*

Quarters and a half, at 17s.	£.	4	13	6	
Draw 2 loads,	-	-	1	12	0
		<hr/>			
Total,	-	-	6	5	6
Expences,	-	-	2	17	3
		<hr/>			
Profit,	-	-	3	8	3
		<hr/>			

1768.

For this crop of drilled pease, see *Experiment*, No. 47. Lofs 6l. 8s. 6d.

1769.

In *April* ploughed it with double coulter, and afterwards ploughed it and broke the clods, which were very rough; with the spiky roller; after the roller ox-harrowed it with six holes. Without the use of this roller, a barley season could never have been made. It was sown with three bushels an acre: after sowing and harrowing clods remaining it was again rolled with little spiky roller: the product 4 quarters *per* acre.

*Expences.*

Ploughing,	-	-	0	7	6
Couls ditto,	-	-	0	7	6
Spiky rolling,	-	-	0	2	0
Ox-harrowing,	-	-	0	3	0
		<hr/>			
Carry over,	-	-	1	0	0

## 452 THE FARMER'S TOUR

Brought over,	-	-	£. 1	0
Three bushels feed,	-	-	0	9
Sowing,	-	-	0	0
Harrowing,	-	-	0	1
Striking furrows,	-	-	0	1
Spiky rolling,	-	-	0	0
Mowing,	-	-	0	2
Harvesting,	-	-	0	4
Thrashing,	-	-	0	6
Carrying,	-	-	0	1
Rent,	-	-	1	2
Total,			3	7

### *Produce.*

4 Quarters, at 20s.	-	-	£. 4	0
Straw 2 loads,	-	-	1	12
Total,			5	12
Expences,			3	7
Profit,			2	4

### *Recapitulation.*

1768. Drilled pease, los,	-	-	6	8
1767. Oats, profit, £.	3	8	3	
1769. Barley, profit,	2	4	7	
			5	12
Los,			0	15
Average,			0	9



*Experiment, No. 75.*

*Course.*

- |           |            |
|-----------|------------|
| 1. Fallow | 3. Madder  |
| 2. Madder | 4. Madder. |

Seven acres; the soil a sandy loam.

Registered in *Experiment, No. 8.* Profit  
the four years 165*l.* 0*s.* 6*d.* or *per acre*  
3*l.* 11*s.* 6*d.* *Per acre per ann.* 7*l.* 17*s.* 2*d.*

*Experiment, No. 76.*

*Course.*

- |           |            |
|-----------|------------|
| 1. Fallow | 3. Madder  |
| 2. Madder | 4. Madder. |

Nine acres; registered in *Experiment,*  
o. 9. Profit on the nine, 245*l.* 1*s.* which  
*per acre* 27*l.* 9*s.* and *per acre per ann.*  
3*s.*

*Experiment, No. 77.*

*Course.*

- |                   |              |
|-------------------|--------------|
| 1. Drilled barley | 3. Potatoes. |
| 2. Ditto beans    |              |

Two acres; the soil a strong loam.

1767.

For drilled barley, see *Experiment, No.*  
Loss 16*s.*

1768.

Drilled with tick beans, double rows, on  
ree-feet lands; product 2 quarters 1  
shel *per acre.*

454 THE FARMER'S TOUR

*Expences.*

Ploughing in autumn,	-	£. 0	9
Water-furrowing,	-	0	1
Drilling in <i>March</i> ,	-	0	1
Two bushels feed,	-	0	6
Striking with double mould-board plough,	-	0	1
Water-furrowing,	-	0	1
Two hand-hoeings,	-	0	10
Shim once,	-	0	0
Double mould-board plough ditto,	-	0	1
Pulling,	-	0	7
Harvesting,	-	0	4
Thrashing,	-	0	2
Rent,	-	1	2
<b>Total,</b>			<b>3 7</b>

*Produce.*

2 Quarters 2 bushels, at 25s.	-	2	13
Straw half a load,	-	0	10
<b>Total,</b>			<b>3 3</b>
<b>Loss,</b>			<b>0 4</b>

1769.

For the potatoes, see *Experiment*, N  
61. Profit 8 l. 6 s. 6 d.

*Recapitulation.*

1769. Potatoes, profit,	£. 8	6	6
1767. Ditto barley, loss,	0	16	0
1768. Beans, ditto,	0	4	0
	<hr/>		1 0 0
Profit,	-	-	7 6 6
	<hr/>		
<i>Per annum,</i>	-	-	2 8 10
	<hr/>		

*Experiment, No. 78.*

*Course.*

1. Drilled barley      3. Turnips.

2. Broad-cast beans

Soil the same as No. 77.

1767.

The drilled barley the same.

1768.

Sown with tick beans ; the crop 2 quarters *per acre.*

*Expences.*

Ploughing,	-	-	0	9	0
Water-furrowing,	-	-	0	1	0
Sowing,	-	-	0	0	3
Three bushels seed,	-	-	0	9	0
Harrowing,	-	-	0	2	0
Striking furrows,	-	-	0	1	2
Water-furrowing,	-	-	0	1	0
Two hand-hoeings,	-	-	0	10	0
	<hr/>				
Carry over,	-	-	1	13	5

G 8 4

## 456 THE FARMER'S TOUR

Brought over,	-	£.	1	13	5
Pulling,	-	-	0	7	0
Harvesting,	-	-	0	4	0
Thrashing,	-	-	0	2	4
Rent,	-	-	1	2	0
Total,			3		8
			8		9

### Produce.

Two quarters, at 25s.	-	2	10	0	
Straw three quarters of a load,	-	0	15	0	
Total,			3		5
			5		0
Loss,	-	0	3	9	

1769.

Well tilled and manured for turnips;  
the crop 3*l.* 3*s.* per acre.

### Expences.

Ploughing,	-	0	9	0	
Water-furrowing,	-	0	1	0	
Hunted in <i>May</i> ,	-	0	7	6	
Ox-harrowing,	-	0	3	9	
17 Loads yard-dung,	-	5	2	0	
Spreading,	-	0	2	0	
Twice ploughing,	-	0	10	6	
Harrowing,	-	0	1	6	
Drilling with the cag-plough,	-	0	0	6	
Seed,	-	0	0	3	
Hand-hoeing,	-	0	10	0	
Rent,	-	1	2	0	
Total,			8		8
			8		6

THROUGH ENGLAND. 457

Expences,	-	-	£. 8	8	6
		<i>Produce.</i>			
Food,	-	-	3	3	0
			<hr/>		
Loss,	-	-	5	5	6
			<hr/>		
<i>Recapitulation.</i>					
1767. Drilled barley, loss,			0	16	0
1768. Beans ditto,	-	-	0	3	9
1769. Turnips ditto,	-	-	5	5	6
			<hr/>		
Loss,	-	-	6	5	3
			<hr/>		
<i>Per ann.</i>	-	-	2	1	9
			<hr/>		

*Experiment, No. 79.*

*Course.*

1. Oats.            2. Beans.            3. Tares.

One acre and three quarters; the soil a strong clay. In 1766 it yielded wheat.

1767.

The stubble of which was ploughed up in *March*, and oats harrowed in; the crop three quarters *per* acre.

*Expences.*

Ploughing,	-	-	0	10	0
Harrowing,	-	-	0	2	0
Seed three bushels,	-	-	0	6	9
Sowing,	-	-	0	0	3
Water-furrowing,	-	-	0	1	0
Mowing,	-	-	0	1	8
			<hr/>		
Carry over,			1	1	8

## 458 THE FARMER'S TOUR

Brought over,	-	£. 1	1	8
Harvesting,	-	0	4	0
Thrashing,	-	0	4	6
Rent, &c.	-	1	2	0
<hr/>				
Total,	-	2	12	2
<hr/>				

### Produce.

Three quarters, at 15s.	-	2	5	0
One load and quarter straw,		1	0	0
<hr/>				
Total,	-	3	5	0
Expences,	-	2	12	2
<hr/>				
Profit,	-	0	12	10
<hr/>				

1768.

Ploughed up the oat stubble in *January*, and harrowed in tick beans; the crop two quarters *per* acre.

### Expences.

Ploughing,	-	0	10	0
Sowing,	-	0	0	3
Three bushels feed,	-	0	9	9
Harrowing,	-	0	4	0
Hand-hoeing once,	-	0	7	0
Pulling,	-	0	7	0
Harvesting,	-	0	4	0
Thrashing,	-	0	3	0
Rent,	-	1	2	0
<hr/>				
Total,	-	3	7	0
<hr/>				

THROUGH ENGLAND. 459

*Produce.*

Two quarters, at 25 s.	-	£. 2	10	0
Straw one load,		1	0	0
<hr/>				
Total,	-	3	10	0
Expences,	-	3	7	0
<hr/>				
Profit,	-	0	3	0
<hr/>				

1769.

Ploughed the bean stubble in *March*, and harrowed in tares in *May*; the crop came but to little, not worth more than 5 s. an acre.

*Expences.*

Ploughing,	-	0	10	0
Sowing,	-	0	0	3
Seed two bushels,	-	0	10	0
Harrowing,	-	0	1	6
Rent,	-	1	2	0
<hr/>				
Total,	-	2	3	9
Produce,	-	0	5	0
<hr/>				
Loss,	-	1	18	9
<hr/>				

*Recapitulation.*

1769. Tares, loss,	-	1	18	0
1767. Oats, profit, £.	0	12	10	
1768. Beans ditto,	0	3	0	
<hr/>				
		0	15	10
Loss,	-	1	2	11
<hr/>				
Which is <i>per ann.</i>	-	0	7	7
<hr/>				

*Observations.*

○ Mr. *Arbutnot* has had such a variety of undertakings in the husbandry way, that all his fields could not possibly receive equal attention. The loss on this field has been first sowing oats after wheat, and afterwards always sowing it on one earth, which on a stiff clay cannot be right. It is a proof, that the common management of these lands yield a very poor advantage at best.

*Experiment, No. 80.**Course.*

- |                   |          |
|-------------------|----------|
| 1. Fallow         | 4. Wheat |
| 2. Drilled barley | 5. Oats. |
| 3. Tares          |          |

Five acres; soil a strong loam on clay; fallowed in 1766, and in 1767 drilled with barley; for which crop see *Experiment, No. 60.* Loss 2*l.* 8*s.* 4*d.*

1768.

Harrowed in tares on two earths; mown for soiling horses; kept ten three weeks, and yielded thirty shillings worth of sheep feed besides.



*Expences.*

First ploughing,	-	£. 0	7	6
Water-furrowing,	-	0	0	6
Second ploughing,	-	0	7	6
Harrowing,	-	0	1	6
Two bushels tares,	-	0	10	0
Mowing and carting,	-	0	5	0
Rent,	-	1	2	0
<hr/>				
Total,	-	2	14	0

*Produce.*

Keeping ten horses four weeks, at 7s. 6d.—15l.; the fifth is		3	0	0
Sheep feed 30s.; the fifth is		0	6	0
<hr/>				
Total,	-	3	6	0
Expences,	-	2	14	0
<hr/>				
Profit,	-	0	12	0

1769.

Harrowed in wheat on one ploughing;  
produce three quarters *per* acre.

*Expences.*

Ploughing,	-	0	7	6
Harrowing,	-	0	1	6
Two bushels feed,	-	0	13	0
Striking furrows,	-	0	0	9
Water-furrowing,	-	0	1	0
Reaping,	-	0	8	6
Harvesting,	-	0	4	0
<hr/>				
Carry over,	-	1	16	3

## 462 THE FARMER'S TOUR

Brought over,	-	-	£. 1	16	3
Thrashing,	-	-	0	9	0
Carrying,	-	-	0	1	6
Rent,	-	-	1	2	0
			<hr/>		
Total,	-	-	3	8	9
			<hr/>		

*Produce.*

Three quarters, at 44 s.	-	-	6	12	0
One load straw,	-	-	1	5	0
			<hr/>		
Total,	-	-	7	17	0
Expences,	-	-	3	8	9
			<hr/>		
Profit,	-	-	4	8	3
			<hr/>		

1770.

Harrowed in oats on one earth: clover was sown on the wheat, but it miscarried, which was the reason of sowing oats; for clover was wanting, under which crop it now is, and very fine. Product 3 quarters *per. acre.*

*Expences.*

Ploughing,	-	-	0	5	0
Harrowing,	-	-	0	2	0
Three bushels feed,	-	-	0	7	6
Sowing,	-	-	0	0	3
Water-furrowing,	-	-	0	1	0
Striking water-furrows,	-	-	0	0	2
Mowing,	-	-	0	2	0
			<hr/>		
Carry over,	-	-	0	17	11

THROUGH ENGLAND. 463

Brought over,	-	-	£. 0	17	11
Harvesting,	-	-	0	5	0
Thrashing,	-	-	0	4	6
Rent,	-	-	1	2	0
<hr/>					
Total,	-	-	2	9	5
<hr/>					

*Product.*

Three quarters,	-	-	3	0	0
Straw one load,	-	-	0	16	0
<hr/>					
Total,	-	-	3	16	0
Expences,	-	-	2	9	5
<hr/>					
Profit,	-	-	1	6	7
<hr/>					

*Recapitulation.*

1768. Tares, profit,	-	-	0	12	0
1769. Wheat ditto.	-	-	4	8	3
1770. Oats ditto,	-	-	1	6	7
<hr/>					
Total,	-	-	6	6	10
1767. Drilled barley, loss,	-	-	2	8	4
<hr/>					
Profit,	-	-	3	18	6
<hr/>					
<i>Per ann.</i>	-	-	0	15	8
<hr/>					

*Experiment, No. 81.*

*Course.*

1. Madder. 2. Ditto. 3. Ditto. 4. Ditto.

Six acres. For the crops, see *Experiment, No. 13.*

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Loss,

## 464 THE FARMER'S TOUR

Loss,	-	-	£. 68	14	0
Which is <i>per</i> acre,			11	9	0
And <i>per</i> acre <i>per</i> ann.			2	17	13

This loss is however but in appearance: such numbers of plants were drawn from it, that, if reckoned, as they are elsewhere, the profit would be very great.

*Experiment, No. 82.*

*Course.*

1. Madder.      2. Ditto.      3. Ditto.

Nine acres: the crop registered in *Experiment, No. 10.* Profit 211*l.* 12*s.* 4*d.*  
*Per* acre 23*l.* 10*s.* 3*d.* *Per* acre *per* ann. 5*l.* 17*s.* 6*d.*

*Experiment, No. 83.*

*Course.*

1. Fallow      3. Madder.  
 2. Madder      4. Ditto.

Ten acres. See *Experiment, No. 14.*  
 Profit 333*l.* 6*s.* which is *per* acre 33*l.* 6*s.* 7*d.* and *per* acre *per* ann. 8*l.* 6*s.* 7*d.*

*Experiment, No. 84.*

*Courses.*

1. Fallow      3. Madder  
 2. Madder      4. Ditto.

Three acres. See *Experiment, No. 15*

Profit,	-	£. 105	7	0
Or <i>per</i> acre,	-	35	2	0
<i>Per</i> acre <i>per</i> ann,	-	8	15	7

# THROUGH ENGLAND. 465

*Experiment, No. 85.*

*Course.*

1. Turnips. 2. Turnips. 3. Turnips.

Two acres; the soil a black rich loam.

1767.

Trench-ploughed some lucerne, and harrowed in turnips: they were drawn for sheep, at 4*l.* an acre.

*Expences.*

Trench-ploughing with <i>Ducket's</i>			
plough,	-	-	£. 0 13 0
Harrowing,	-	-	0 2 0
sowing,	-	-	0 0 3
seed,	-	-	0 0 6
Twice hand-hoeing,	-	-	0 10 0
Rent, &c.	-	-	1 6 0
<hr/>			
Total,	-	-	2 11 9
<hr/>			

*Product.*

By sheep feed,	-	-	4 0 0
Expences,	-	-	2 11 9
<hr/>			
Profit,	-	-	1 8 3
<hr/>			

1768.

Trench-ploughed it again, and harrowed in turnips, fed on the land by sheep, 3*l.* an acre.

# 466 THE FARMER'S TOUR

## *Expences.*

Ploughing,	-	-	£. 0	13	0
Harrowing and sowing,			0	2	9
Seed,	-	-	0	0	6
Twice hand-hoeing,		-	0	10	0
Rent, &c.		-	1	6	0
Total,			<hr/>		
		-	2	12	3

## *Produce.*

Sheep feed,	-	-	3	0	0
Expences,		-	2	12	0
Profit,			<hr/>		
		-	0	8	0

1769.

Trench-ploughed again for turnips, as before ; fed with sheep, 3*l.* 10*s.* *per* acre.

## *Product.*

Sheep feed,	-	-	3	10	0
Expences as before, except but one hoeing,		-	2	7	3
Profit,			<hr/>		
		-	1	2	9

## *Recapitulation.*

1767. Turnips, profit,	-	-	1	8	3
1768. Ditto, ditto,		-	0	8	0
1769. Ditto, ditto,		-	1	2	9
Total,			<hr/>		
		-	2	19	0
<i>Per annum,</i>			<hr/>		
		-	0	19	8

## THROUGH ENGLAND. 467

But in addition to this profit is that very great one of feeding on the land by sheep, which is certainly more than 19s. 8d. a year.

### *Experiment, No. 86.*

#### *Course.*

- |           |            |
|-----------|------------|
| 1. Fallow | 3. Madder  |
| 2. Madder | 4. Madder. |

Four acres; registered in *Experiment, No. 12.*

Profit,	-		£. 97	19	4
<i>Per acre,</i>	-	-	24	9	10
<i>Per acre per annum,</i>			6	2	5½

### *Experiment, No. 87.*

#### *Course.*

- |            |             |
|------------|-------------|
| 1. Lucerne | 4. Lucerne  |
| 2. Lucerne | 5. Lucerne. |
| 3. Lucerne |             |

Twelve acres. See *Experiment, No. 5.*

Profit *per acre per ann.* 6l. 4s. 4d.

### *General Observations.*

In order to draw those really useful conclusions from the preceding register of courses, which they certainly will afford, it is necessary to state them in one complete view, retaining no other circumstances than the crops, and the clear profit or loss.

# 468 THE FARMER'S TOUR

*Courses that have proved profitable.*

Experi- ment,	No.	Expended in manure.			Profit per acre per annum.			
		l.	s.	d.	l.	s.	d.	
	62.	1. Pease, 2. Winter tares, 3. Fallow, 4. Wheat,	0	0	0	2	9	0
	64.	1. Barley, 2. Clover, 3. Clo- ver, 4. Wheat, -	4	5	6	3	19	8
	66.	1. Oats, 2. Pease, 3. Fal- low, 4. Wheat, -	2	5	6	1	10	1
	67.	1. Beans, 2. Wheat, 3. Tares,	3	18	3	6	1	7
	68.	1. Drilled beans, 2. Drilled wheat, 3. Drilled beans, 4. Winter tares, -	0	0	0	2	16	0
	69.	1. Stubble, 2. Fallow, 3. Drilled wheat, 4. Drilled beans, -	1	8	6	0	6	7
	70.	1. Fallow, 2. Drilled beans, 3. Wheat, 4. Drilled beans,	1	8	2	2	3	10
	71.	1. Drilled pease, 2. Drilled wheat, 3. Beans, 4. Wheat,	2	13	0	1	9	4
	72.	1. Drilled beans, 2. Ditto wheat, 3. Ditto beans, 4. Ditto wheat, -	2	10	0	3	15	2
	73.	1. Fallow, 2. Drilled beans, 3. Ditto wheat, 4. Ditto beans, - -	0	19	0	1	1	11
	73.*	1. Oats, 2. Tares, 3. Fal- low, 4. Drilled wheat,	1	2	10	1	5	11
	75.	1. Fallow, 2. Madder, 3. Madder, 4. Madder,	3	10	0	7	17	2
	76.	1. Fallow, 2. Madder, 3. Madder, 4. Madder,	7	10	0	9	3	0
	77.	1. Drilled barley, 2. Ditto beans, 3. Potatoes,	4	10	0	2	8	10
	80.	1. Fallow, 2. Drilled barley, 3. Tares, 4. Wheat, 5. Oats,	0	0	0	0	15	8
	82.	1. Madder, 2. Madder, 3. Madder, - -	3	12	6	5	17	6
	83.	1. Fallow, 2. Madder, 3. Madder, 4. Madder,	6	0	0	11	10	7



# THROUGH ENGLAND. 469

*Courses that have proved profitable, continued.*

Experi- ment,	Expended in manure.			Profit per acre per annum.		
	l.	s.	d.	l.	s.	d.
1. Fallow, 2. Madder, 3. Madder, 4. Madder,	3	12	0	7	4	11
1. Fallow, 2. Madder, 3. Madder, 4. Madder,	6	0	0	8	15	7
1. Turnips, 2. Turnips, 3. Turnips, -	0	0	0	0	19	8
1. Fallow, 2. Madder, 3. Madder, 4. Madder,	2	4	0	6	2	5
1. Lucerne, 2. Lucerne, 3. Lucerne, 4. Lucerne, 5. Lucerne, -	0	0	0	6	4	4

*Courses that have been attended with loss.*

	Manure.			Loss.		
1. Fallow, 2. Spring tares, 3. Wheat, 4. Oats,	1	1	6	0	2	2
1. Tares and flax, 2. Fallow, 3. Tares, 4. Wheat,	1	1	6	0	6	9
1. Oats, 2. Drilled pease, 3. Barley, -	6	15	0	0	5	2
1. Drilled barley, 2. Beans, 3. Turnips, -	5	4	0	2	1	9
1. Oats, 2. Beans, 3. Tares, 4. Madder, 2. Madder, 3. Madder, 4. Madder,	0	0	0	0	7	7
1. Madder, 2. Madder, 3. Madder, 4. Madder,	0	0	0	2	17	3

The first object that strikes one here is, the vast profit attending ample manurings; by dividing the table, this will appear de-  
ve.

# 470 THE FARMER'S TOUR

*'Courses manured' for above 3l. an acre.*

			<i>Profit.</i>
No. 64,	-	-	£. 3 19
67,	-	-	- 6 1
75, Madder,	-	-	7 17
76, Ditto,	-	-	9 3
77,	-	-	2 8 1
82, Madder,	-	-	5 17
83, Ditto,	-	-	8 6
83, Ditto,	-	-	7 4 1
84, Ditto,	-	-	- 8 15
Total,	-	-	<u>59 14 1</u>
74, Lofs,	£. 0	5 2	
78, Ditto,	2	1 9	
			<u>2 6 1</u>
Total,	-	-	<u>57 7 1</u>
Average,	-	-	<u>5 4</u>

*'Courses manured for under 3l. an acre.*

			<i>Profit.</i>
No. 66,	-	-	1 10
69,	-	-	0 6
70,	-	-	2 3 1
71,	-	-	1 9
72,	-	-	3 15
73,	-	-	1 1 1
73*,	-	-	1 5 1
86,	-	-	6 2 5
Total,	-	-	<u>17 15 3</u>
63, Lofs,	-	0 2 2	
65,	-	0 6 9	
			<u>0 8 1</u>
Total,	-	-	<u>17 6 4</u>
Average,	-	-	<u>1 14</u>

# THROUGH ENGLAND. 471

## *Unmanured crops.*

No. 62, Profit,	-	-	-	£. 2	9	0
68,	-	-	-	2	16	0
80,	-	-	-	0	15	8
85,	-	-	-	0	19	8
Total,	-	-	-	7	0	4
79, Loss,	£.	0	7	7		
81, Madder,	2	17	3			
				3	4	10
Total,	-	-	-	3	15	6
Average,	-	-	-	0	12	7
				6	4	4

Madder excluded the account will be thus.

## *Manurings above 3l. an acre.*

No. 64, Profit,	-	-	-	3	19	8
67,	-	-	-	6	1	7
77,	-	-	-	2	8	10
Total,	-	-	-	12	10	1
74, Loss,	0	5	2			
78, Ditto,	2	1	9			
				2	6	11
Total,	-	-	-	10	3	2
Average,	-	-	-	2	0	7

472 THE FARMER'S TOUR

*Manurings under 3l. an acre.*

Average profit, as before, £. 1 14 7

*The unmanured crops.*

No. 62, 68, 80, and 85, 7 0 4  
 79, Lofs, - - 0 7 7

Total, - - 6 12 9

Average, - 1 6 6

Manured for above 3l. - 2 0 7

Under 3l. - 1 14 7

Superiority, - 0 6 0

Above 3l. - - 2 0 7

Unmanured, - - 1 6 6

Superiority, - 0 14 1

Under 3l. - - - 1 14 7

Unmanured, - - - 1 6 6

Superiority, - 0 8 1

Lucerne is excluded, which is so uncommonly profitable without manuring, that it would overturn all conclusions.

From this view of the crops, with an eye to manures, it is very evident, that *profit* depends very much on *manure*, and that

that the degree of the one is very intimately connected with the other. This is a general result; but not so important as a more particular one. From examining the courses, it appears, that very ample manurings will be but losing, unless the *course* is good: thus, in 74 and 78, drilled pease and drilled barley are introduced, both crops improper for this soil; so that manuring of 6*l.* 15*s.* and 5*l.* 4*s.* are attended only with loss. No. 68, though unmanured, pays 2*l.* 16*s.* profit; whereas No. 80, unmanured, pays but 15*s.* 8*d.* This is owing to drilled beans being in one, and drilled barley in the other.

The most profitable courses are;

- No. 64. 1. Barley, 2. Clover,  
 3. Clover, 4. Wheat: it pays £. 3 19 8  
 No. 67. 1. Beans, 2. Wheat,  
 3. Tares, - - - 6 1 7  
 No. 72. 1. Beans, 2. Wheat,  
 3. Beans, 4. Wheat: all drilled, 3 15 2

Hence it is evident, that the most profitable method of manuring these soils is to make clover, beans and tares, the fallow crops, and to have wheat the only white corn one. This will be further illustrated by selecting the next rank of profitable crops.

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No. 68. 1. Drilled beans, 2. Ditto wheat, 3. Ditto beans, 4. Winter tares, - - - £. 2 16 0

No. 70. 1. Fallow, 2. Drilled beans, 3. Wheat, 4. Drilled beans, - - - 2 3 10

No. 77. 1. Drilled barley, 2. Ditto beans, 3. Potatoes, - - - 2 8 10

The drilled barley was unprofitable; this profit was therefore on the beans, &c. This scale of profit shews evidently the beneficial courses; as to barley, oats, and turnips, they are comparatively contemptible to the superior crops of clover, beans, tares, and wheat. Potatoes are but once tried; but they bid extremely fair for exceeding any.

Wheat appears to pay very well for a complete summer fallow.

If a hint is taken from these courses, such an one as the following may probably be found uniformly advantageous.

- |                  |                 |
|------------------|-----------------|
| 1. Fallow        | 8. Winter tares |
| 2. Wheat         | 9. Beans        |
| 3. Beans drilled | 10. Wheat       |
| 4. Oats          | 11. Potatoes    |
| 5. Clover        | 12. Oats        |
| 6. Clover        | 13. Clover      |
| 7. Wheat         | 14. Wheat.      |

It may be supposed I introduce the oats merely as an introduction to the clover, and for the sake of some straw, in case it could not be bought. A farm thus disposed would be,

Four	Fourteenths	in	Wheat.
Two	Ditto		Oats.
Two	Ditto		Beans.
One	Ditto		Tares.
Three	Ditto		Clover.
One	Ditto		Potatoes.
One	Ditto		Fallow.

I mention nothing of cabbages, because they are not yet experienced on this farm.

Eight fourteenths, cleanse and ameliorate.

Six ditto, foul and exhaust.

The land therefore must always be clean and in good heart.

This for common husbandry; but the great profit is to manure very richly, and plant madder. The clear profit of the madder courses far exceeds the common ones; but lucerne, without any manure at all, comes nearly to madder with great quantities.

## VI. MISCELLANEOUS EXPERIMENTS.

Mr. *Arbuthnot's* attention to husbandry has been in no respect confined: some objects,

jects, as may be easily conceived, have demanded more spirited efforts than others; but very few have been neglected. It will, for the sake of clearness, be requisite to throw those enquiries, which have not been made in so extended a manner as the rest, into a division by themselves. They will be properly arranged under the following heads.

- |                    |                      |
|--------------------|----------------------|
| 1. Manures         | 7. Carrots           |
| 2. Draining        | 8. Destroying        |
| 3. Deep ploughing  | thistles             |
| 4. Velvet wheat    | 9. Black bent        |
| 5. Growth of wheat | 10. Sheep            |
| 6. Feeding wheat   | 11. Planting poplars |

#### MANURES.

This gentleman, in his culture of madder, &c. has manured various of his fields in a much richer manner than I remember any where to have seen: it has been done with farm-yard dung, raised at home, and also with large quantities purchased at *London*: this practice has been carried on in so large a scale, that the experimental register of it, unless various divisions had been made with infinite trouble, could not be decisive. His general manuring therefore is not to be gathered from the following



trials, which are upon a different plan. The manures tried are, trotters, wood ashes, foot, coal ashes, rabbit dung, malt dust, night soil, folding sheep.

## TROTTERS.

*Experiment, No. 88.*

This manure was tried on both strong and light loam for wheat, and also for madder, 5 quarters *per* acre, at 9s. besides carriage from *London*. They were not attended by any visible advantage in either crop, which he attributes to their going through the hands of the glue makers.

## WOOD ASHES.

*Experiment, No. 89.*

Sowed them on arable lands in various fields; 25 bushels an acre; but they yielded no sort of advantage.

*Experiment, No. 90.*

Tried them on grass land; the benefit there was great. The farmers were of opinion, that dressing would burn up the grass, which would be the case if laid in heaps to be strewed; on which account they must be spread directly out of a little cart. They were collected from *Banstead* downs, at 3d. a bushel.

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### SOOT.

*Experiment, No. 91.*

Sowed 30 bushels an acre on grass land, at 7*d.* a bushel, besides carriage and 1*d.* sowing. From various trials, the effect was found to be very great, if done early in *February*, and equally beneficial sown on green wheat at the same time.

### COAL ASHES.

*Experiment, No. 92.*

A comparison was formed between coal ashes and soot, on grass land: the ashes were sifted remarkably fine; 40 bushels *per* acre were sown of each. At first the soot made the greatest appearance; but there was no visible difference in the crop of hay.

### RABBIT'S DUNG.

*Experiment, No. 93.*

This is the principal top dressing used by Mr. *Arbutnot*: he has tried it on almost all the fields of his farm. He sows 25 sacks an acre over most of his wheat in *March*, at 1*s.* 2*d.* a sack, carriage included; and this is in general the only manure he uses for his wheat: on the drilled crop it was hoed in, and on the broad-cast harrowed. The advantage in general very great.

*Experiment, No. 94.*

In *November*, a comparison was made between rabbit's dung, chicken's dung, and wood ashes, in the proportion *per acre* of 18 sacks of each. The chicken's dung was by far the best, the rabbit's next, and the wood ashes last.

MALT DUST.

*Experiment, No. 95.*

Fifty bushels an acre of kiln dust were tried against 20 sacks of coal ashes on arable land, and turned out much superior.

NIGHT SOIL.

*Experiment, No. 96.*

Tried for cabbages and madder, 10 loads an acre. It promises greatly.

FOLDING SHEEP.

*Experiment, No. 97.*

Mr. *Arbuthnot* has been so well convinced of the great importance of the sheep fold, that his constant practice, when the land is not dry enough for the common one, is to pen them in a standing fold on a head land, well littered with straw every day, or every other day, as circumstances admit, so as the sheep may always be dry.

One hundred and thirty-four sheep and 30 lambs penned in this manner 6 weeks

## 480 THE FARMER'S TOUR

were littered with 5 loads and 40 trufs of oat straw, (40*lb.* to the trufs.) They made 28 large loads of dung. They were fed morning and evening with turnips in the pen, and let out in the middle of the day for 4 or 5 hours. In the above time eat 2 acres of turnips. The dung thus made was equal to any that can be had; full as good as what he brings from *London* at 10*s.* a load.

Suppose the quantity 20 such loads as brought from <i>London</i> ,	-	-	£. 10	0	0
Five loads and 40 trufs, at 20 <i>s.</i>					
at the pen,	-	-	5	15	0
			<hr/>		
Profit by the dung,	-	-	4	5	0
			<hr/>		
Which is <i>per</i> acre for the turnips,			2	2	6
			<hr/>		
And <i>per</i> score <i>per</i> week for the sheep,	-	-	0	1	9 $\frac{1}{4}$
			<hr/>		

This trial shews the advantage of such folding in the clearest manner; it also proves that a very high price may be paid for straw with great profit: 20*s.* a trussed load is high; but had 30*s.* been given, there would yet have remained a considerable profit. It is true, there is a great advantage

advantage by eating the turnips on the land where they grow; but that can only be done in dry soils, whereas this method is applicable to all.

DRAINING.

*Experiment, No. 98.*

Seven acres of arable land and four of grafs were drained by covered drains: furrows were drawn by the common ploughs, 3 inches deep, to mark out the cuts; they were then dug with draining-spades, to the depth of 20 inches, at the expence of 3 *d.*  $\frac{1}{2}$  per perch digging, filling, &c. They were struck in parallel lines diagonally across the slope of the fields, at the distance of 2 perch from each other; but Mr. *Arbutnot* remarks, that to drain his land properly, the cuts should be but one rod asunder. They were filled with thorns, 2 loads of which filled the drains of an acre.

Suppose an oblong, 40 perch long, and 12 broad, it contains 3 acres.

In the above method of draining, there will be 5 drains, each 40 perch long, or 200 perch, which at 3 *d.*  $\frac{1}{2}$  come to, for 3 acres,

£.	2	18	4

Carry over,	-	2	18	4
-------------	---	---	----	---

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Brought over, -	£. 2 18 4
Drawing furrows, -	0 1 8
<hr/>	
Three acres, -	3 0 0
<hr/>	
Which is <i>per</i> acre,	1 0 0
Two loads of thorns, suppose	0 15 0
<hr/>	
Total <i>per</i> acre, -	1 15 0
<hr/>	

### Experiment, No. 99.

The expence of the above drains being something considerable, and good hands used to the work, not being always to be had, Mr. *Arbutnot* deferred the draining his whole farm, until he could invent a plough that would perform the operation. In this design he succeeded, and with the plough drained 26 acres of grass land, the drains 2 perch afunder, as above, 17 inches deep, 2 wide at bottom, and 8  $\frac{1}{2}$  at top. Filled like the others with thorns; but from the cuts being truer, and narrower at bottom than they can be dug, 1 load of thorns filled 170 perch. Twelve horses were used, and the whole expence of ploughing, filling, &c. came to 1 *d.* *per* perch.

200 Perch, at 1 <i>d.</i> on 3 acres,	£. 0 16 8
<hr/>	
Which is <i>per</i> acre,	0 5 6

## THROUGH ENGLAND. 483

Brought over,	£.	0	5	6½
One load thorns,		0	7	6
This is something over the truth.				—
Total <i>per</i> acre,		0	13	0½
Expence <i>per</i> acre with the spade,	1	15	0	
With the plough,		0	13	0½
Superiority,	1	1	11½	

This prodigious saving, which, in a few acres, would at once pay the expence of the implement, should call the attention of all, who have any quantity of land to drain in this manner. With this noble implement the trouble and expence of covered drains are reduced to a trifle, to much less than one crop of any sort would pay.

But here I should observe, that this experiment was made with the plough, before it was perfected by adding wheels of five feet instead of the former ones of two feet: he has reduced the draft four horses; so that it is now worked with only eight, consequently will do its work cheaper than mentioned in the above calculation. For an explanation see plate XV.

### DEEP PLOUGHING.

This part of husbandry Mr. *Arbutnot* has practised upon the largest scale, and

with very great success. His soil is chiefly a strong loam, never ploughed before more than five inches deep: he has stirred it 12 inches, and the additional seven are a strong brick earth. He always begins with a winter fallow, and leaves it through the winter for beans, on one spring ploughing. No manuring, except some with lime. The beans very good crops: much too good to give the least reason to suppose them the worse for the deep ploughing, especially as the ground was in general very foul and poor. The beans have been followed by various other crops, none of which have indicated any ill effect from deep ploughing. He makes it a rule, never to sow any fibrous-rooted crop for the first after this operation. He once sowed barley on it, and laid down to clover: the barley a poor crop; but the clover took perfectly well: it was dunged, and yielded a very large product; also one the second year, after which it was fed; and trench-ploughed for wheat. The crop four quarters an acre, though it appeared to be much hurt by the worm, and was fed bare with sheep in *March*.



## VELVIT WHEAT.

*Experiment, No. 100.*

In 1768, Mr. *Arbutnot* gathered six ears of this wheat, from the down on it attracting this notice; and carrying it to market, the farmers remarked that they knew it, but had lost the sort, and called it velvit wheat. This induced him to sow it seed by seed in 1768. He took off the tillers and transplanted them, which operation he repeated, and planted them in the middle of a field of beans, to avoid blending the different *farina* of the wheats. In doing this he observed, that the transplanted plants run away for seed before their own tillers came into ear; so that if this method was practised in common, there would be a fortnight difference in the ripening of the ears of the same plant; for which reason it is a mere matter of curiosity.

The product of the six ears was 14 quarts, which were drilled on one acre, in four rows, eight inches asunder, on four-foot lands: some of it in double rows, 14 inches, on the same size lands: they were both hand and horse-hoed sufficiently, to keep them quite clean. In harvest, the products of the two ways of drilling were

blended together through hurry; but the total was three quarters three pecks; which quantity, from less than two pecks of seed, he justly esteems a very great produce, and attributes it to the sort of wheat. The land had been ploughed 14 inches deep for madder. Such a crop shews the good effect of both deep ploughing and madder, in preparing for wheat.

He proposes sowing it all this year, after which the sort will be fully regained.

### GROWTH OF WHEAT.

*Experiment, No. 101.*

Mr. *Arbutnot*, receiving a hint from Dr. *Fordyce*, on the different succession of the roots of plants, and finding the same clearly laid down in a manuscript, said to be written by Dr. *Cullen*, Professor of Chemistry at *Edinburgh*, who explains the nature of the roots of all culmiferous plants in the following words: "Culmiferous plants have three sets of fibres: the first set is formed on the radicle, the second set is formed above this, at a knot on the plumula; the third, at a knot in the plumula, above the second: this the discovery of *Bennet*. Upon the due formation of these three knots and sets of fibres, I judge

judge the tillering of frumentaceous plants does entirely depend: that if these knots are imperfectly formed, the plant imperfectly tillers." These three knots are termed by *Bennet*, the infancy, the adolescence, and maturity of the plant. At the two uppermost knots the tillering is formed.

Mr. *Arbutnot* was hence induced to sow a few grains in water, to watch the succession of the roots. He cut a hole an inch square in a bung-cork, in which he laid some wool, and upon that three grains of white wheat, and floated on water in a glass tube 18 inches long. First there were three fibres shot from the radicle, which branched into innumerable fibres; upon the wheat spearing fresh fibres struck out, as described by *Dr. Cullen*. Soon after they were established, the three first fibres with their branches gradually decayed; as soon as it was in ear, the fresh fibres made their appearance, soon after which the second decayed, and the last remained in possession of the water. The roots straightened, when taken out of the water, measured  $2\frac{1}{2}$  feet long. It blossomed and ripened in its regular course; each ear had one grain; sowed

one of the grains in the open garden, and when proper to separate the tillers, it was done, and again a second time, to the amount in all of 98 plants. They promised to produce a great burthen; but being near a hedge, the birds eat them; the wheat very fine.

Tried the same experiment in another glass, mixed with some wood ashes: the seed rotted on the surface, owing, as supposed, to the quantity of wood ashes being too great. The motive was to see if it would lead to any discoveries of the cause of smut; for Mr. *Arbutnot* apprehended that disease to be owing to a want of proper nourishment in the last succession of roots: the grain then being in a mucilaginous state, there may not be a sufficient quantity of food to carry it through that state. He has observed, that part of a field, which has been full of weeds, smutted, when the rest has escaped; and, likewise, that when strong land has been much poached in sowing, and afterwards baked, whether on the head-lands or middle of the field, such parts have been most subject to smut, owing, as he believes, to the surface of the earth not being pervious enough to

admit

admit the last set of fibres, which it is to be observed first shoot from the pumula into the open air, and then introduce themselves into the surface, frequently at the distance of three quarters of an inch. This fact Mr. *Arbutnot* has many times remarked, in examining the roots of field wheat.

### FEEDING WHEAT.

*Experiment, No. 105.*

This gentleman, from observing the effect of feeding wheat in the spring, apprehends it to be very beneficial to a thin crop, and as prejudicial to a thick one: the feeding makes it tiller; but then it should be done by turning in a flock, that will eat it down in two or three days, and not by a few, who will pick and cull the shoots.

In *March, 1770*, he turned his flock into one half of a wheat field, intending to eat that half quite down to the ground, and to leave the other untouched. Wet coming on, obliged the sheep to be removed; nor could they afterwards be put in again, as the wheat began to spine. The side of the field fed appeared rather the better crop of the two.

of *Experiment*, No. 106.

Sowed carrot seed in *March*. When the plants were 2 inches high, some were transplanted; it was about the middle of *May*. In drawing them up, the ends of the tap-roots were broken off. This idea of transplanting carrots arose from the great expence of hoeing that crop, much of which would be saved by this practice. One of the plants taken up at random in *September*, weighed 3 lb.; the top 1 lb. the root 2 lb. The principal root for 4 inches deep was 4 in diameter; and then branched into five fine straight roots.

*Experiment*, No. 107.

Mr. *Arbutnot* having observed in *East-Frizeland*, that it was the custom to sow carrots in the spring on wheat and rye, and to harrow the seed in, he was induced to try it in 1768. The field a strong loam on clay. In *May* he drilled a row of carrots between two of wheat, at 14 inches, on  $3\frac{1}{2}$  feet lands, and also broad-cast over several acres. The seed was mixed with bran, in which manner his drill delivered it very regularly. After the wheat was reaped, they were hand-hoed; the produce 40 bushels

bushels *per* acre. And this practice he thinks may turn out profitable on light deep soils. In *Frizeland* it is the custom to plough them up and house, or to turn their hogs into the field, and eat them on the land.

*Observations.*

The carrot being a tap-rooted plant, in all probability the damage they do the wheat is inconsiderable, or at least not to be named with a product of 40 bushels an acre. Carrots are very well worth 1s. a bushel in feeding cattle; 40s. an acre, added to the wheat, is an object of no slight magnitude; besides, it is observable, that these were drilled so late as *May*, which is at least two months too late; also, that the soil is very stiff, instead of being light, which is what the root delights in: upon the whole, it is fairly to be presumed, that the practice may prove beneficial on many soils. Another circumstance is the ploughing, which the land gets at *Michaelmas* for raising them, which it otherwise perhaps would not have.

DESTROYING THISTLES.

*Experiment, No. 108.*

In a large field laid to grass, the land having been very foul, innumerable thistles

after-

afterwards appeared; they were repeatedly spudded without any effect—they were repeatedly mown with no better: after this they were suffered to stand till just going to blossom; the heads only were then cut off: this appeared to weaken the plants. They put out lateral shoots only from the stem, whereas those that were spudded put out numberless tillers; but still they were not destroyed. Mr. *Arbutnot* having remarked, that rolling in the spring, while the land is wet, was fatal to the crop of grass, determined to roll this land when very wet, with an heavy roller: he accordingly did it, and the effect has been so great, that since this operation scarcely a thistle has appeared; but he spoiled his crop of hay.

In other fields he has mown, and then bruised them with the heavy roller in dry weather, but without any effect.

#### BLACK BENT.

This weed, called in some places mouse tail, is more difficult to extirpate than many other annuals; but Mr. *Arbutnot* has found the following method very effectual.

Plough up the stubble in *September*, and leave it for the winter: in spring, pulverize it as soon and as fine as possible; so let it remain



remain for the bent to vegetate: then plough it up and sow summer tares, or any thing that comes off soon enough to leave time for ploughing it well before winter. Lay it up on the ridge, to be secure from rain; if the black bent springs again, plough the whole surface of the land with the shim, after which harrow and leave it for sowing wheat under furrow, shallow, and very late. This method is also good for the destruction of all seed weeds, if no couch is in the land: drilled crops, by admitting the hand-hoe, are excellent in destroying it.

## SHEEP.

*Experiment, No. 109.*

Mr. *Arbuthnot* having 20 ewes with their lambs put to turnips in *February*, in three days the ewes shewed the appearance of the last stage of the rot, though not perceptible before; their wool quitting the side on the least touch, their eyes of a yellow livid colour, not the least redness remaining in their gums, and the wax on the side of their udders being quite dry: many of them scarcely able to walk. They were taken from turnips and put in a pen, having nothing to eat but dry meat, hay, ground

ground beans and bran, sprinkled with salt: they loathed their food, seemingly for want of moisture: forge water, mixed with the water out of the madder copper, was given them, being a simple decoction of madder, and this they drank regularly.

Next, they had each a dose of calomel and rhubarb, the same quantity as to a grown person: this purged them extremely, and brought away a most fetid, nauseous, slimy matter. As soon as they knit, they had soap and bark given them every other morning; upon which they began to thrive, and the symptoms of health appeared in the above-mentioned circumstances. The lambs were suffered all the time to run in and out the pen. Three ewes only died; the rest have borne lambs since, and are now fatting.

This success induced him to procure some rotten sheep from a farmer in the neighbourhood, who sent him four wethers in a cart, so bad that they could not walk: one died on the road. These had not the symptoms above mentioned so strong as the 20 ewes, but had water-bladders under the gullet; in this he put a seaton of turpentine, and treated them like the rest. All died;

and, what is extraordinary, Mr. Neal (the farmer from whom he had them) saved all his flock, though many of them as bad as these, by giving them a spoonful of turpentine in a gill of water, once in three days.

Respecting the breed of sheep, Mr. *Arbutnot* was recommended to try the *Northampton* and *Leicester* sort; but they did not well with him: they would not thrive, owing, as he apprehends, to the pasture not being rich enough: when fat, they came to 35 *lb.* a quarter. The quality of their wool declined. He finds from experience, that the *Wiltshire* and *Hampshire* suit him best. The *Dorsets*, bought in in lamb, and kept in the inclosures, fatten their lambs well; but must themselves be fattened off by *Michaelmas*, as they are too delicate for the commons of this country.

### PLANTING.

#### *Experiment, No. 110.*

Nine years ago planted some black poplars, eight feet asunder; the size about 1  $\frac{1}{2}$  inch diameter: measured two of them. No. 1. The best contains 13 feet of timber, which would sell at 10 *d.* a-foot, and the  
forks

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forks in the top would give three rails, worth with the faggots 2s. In all 12s. 10d.

No. 2. The worst, 12½ feet of timber, and the top worth 1s. In all 10s. 5d.

Average, 11s. 7d.

An acre planted in squares of 8 feet would contain 680 trees, which, at 11s. 7d. amount to - - - - £. 393 0 0

### Expences.

Suppose the trees bought or raised at 3d. each; - - -	£. 8 10 0
Planting, - - - - -	0 5 0
Filling vacancies by death; suppose 50, - - - - -	0 12 6
Fencing repairs, - - - - -	0 10 0
Nine years rent, suppose at 30s. - - - - -	13 10 0
	<hr/>
Total, - - - - -	23 7 6
	<hr/>
Product, - - - - -	393 0 0
Expences, - - - - -	23 7 6
	<hr/>
Profit, - - - - -	369 12 6
	<hr/>

Which is *per acre per ann.* 41 1 4

No husbandry or gardening in the world will equal this vast profit. It is astonishing that more plantations of such quick-growing trees

trees are not made. This soil is a black, rich, low ground, near water.

*Experiment, No. 3.*

Some willows planted at the same time and distance, measured on an average 18 feet of timber, worth 6*d.* a foot, and the tops 1*s.* 6*d.*

680, at 10 <i>s.</i> 6 <i>d.</i>	-		£. 357	0	0
Expences as above,	-		23	7	6
Profit,	-	-	333	12	6
Or <i>per acre per ann.</i>			37	1	4

From which most considerable return there is no slight reason to suppose the common idea, that this tree should for profit have the head cut off, is an error; for it is a question, whether the product by faggots would equal half this. But in situations, where poles sell well, Mr. *Arbutnot* observes, that you may cut them every six years, and sell at an amazing price, but not for faggots. He likewise remarks, that the body of the willow tree rives into pales, which are admirable for fences, hardening in the air, and are nearly as durable as oak.

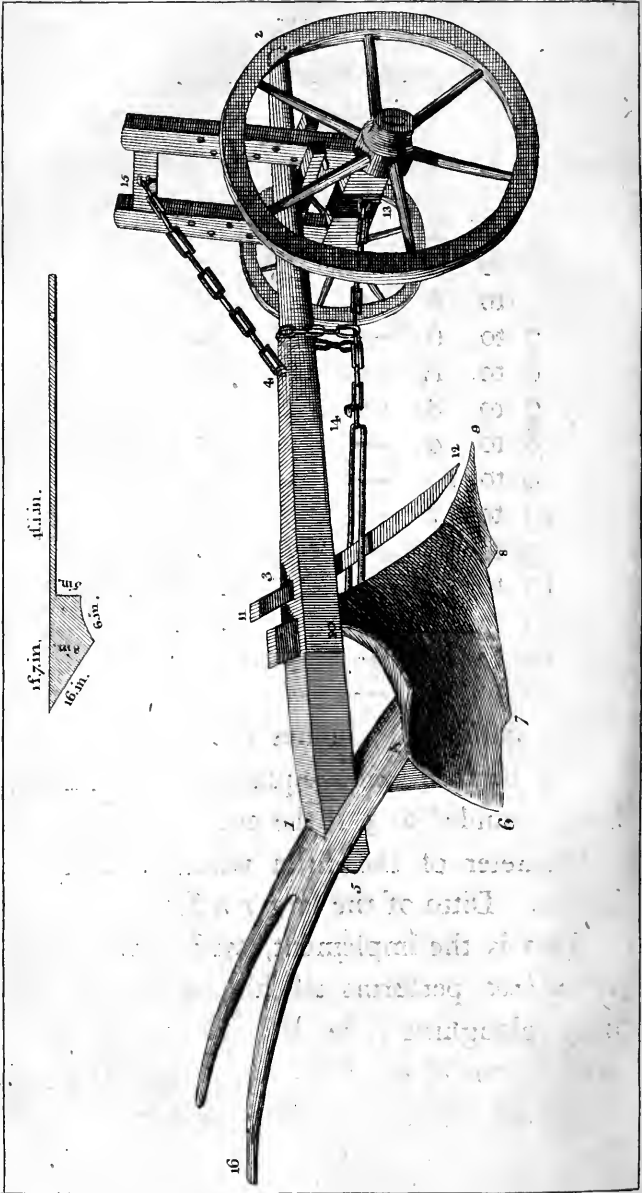
## VII. IMPLEMENTS.

If a person, the least skilled in agriculture, looks around for instruments that deserve to be called complete, how few will he meet with! Every day brings to light new plans of culture, for the profitable execution of which peculiar instruments are necessary: it is often the want of these that casts a damp on beginnings, which would otherwise turn out highly successful; but being liable to numerous miscarriages, and great expences, for want of the proper machines, the modes of culture are themselves condemned. The new husbandry, among other instances, may be quoted, which absolutely depends on the merit of the implements used.

Mr. *Arbuthnot*, on his beginning this course of trials, experienced the inconveniences here mentioned; and this induced him to invent a great variety of most excellent machines subservient to husbandry, with which he has been enabled to carry several branches of culture to a perfection unknown before; and, at the same time, at a much lower expence, than was possible to be effected with the tools before in use. I will venture to assert, that the following

THE HISTORY OF THE  
REIGN OF KING CHARLES THE SECOND

In the year 1649, the king was beheaded at the  
block in the market place of London. His  
body was buried in St. Dunstons Church, and  
his head was set upon a pole in the market  
place. The king was buried in the same  
place as his father, King James the first.  
The king was buried in the same place as  
his father, King James the first. The king  
was buried in the same place as his father,  
King James the first. The king was buried  
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the first. The king was buried in the same  
place as his father, King James the first.



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lowing implements will do honour to their inventor.

Plate IX.

*The great Wheel Plough.*

*References.*

From 1 to 2	—	10 Feet 0 Inches.
1 to 3	—	3 2
3 to 4	—	2 8
4 to 2	—	4 0
5 to 6	—	1 8
7 to 6	—	2 0
6 to A	—	1 2
7 to 8	—	2 1
8 to 9	—	1 7
9 to 10	—	2 9
11 to 12	—	3 3
7 to 10	—	2 10
13 to 14	—	3 but variable.
4 to 15	—	3 ditto.
13 to 15	—	3 0
16 to 1	—	5 0

The gallows 17 inches wide.

The beam 6 inches square at the coulter hole, rounded to 3 at the end.

Diameter of the little wheel 2 feet 4 inches. Ditto of the larger 4 feet.

This is the implement, with which Mr. *Arbutnot* performs all his operations of deep ploughing; he stirs 18 inches deep with it, the draft 8 to 12 horses. It performs the work in the best manner.

# 500 THE FARMER'S TOUR

Plate X. Fig. 1.

*The small spiky Roller.*

*References.*

a to b	—	10	0	Feet 0 Inches.
b to c	—	3	0	
b to e	—	2	10	
e to f	—	3	0	
g to i	—	1	8	
g to n	—	2	0	
k to l	—	2	3	
i to m	—	0		6 Inches broad at bottom, 15 a- bove the axle.

Diameter of the cylinder 1 foot 8 inches.

This roller, being drawn through any furrows, whether those of beds in fallowing, or the intervals of drilled crops, &c. is of very great use in pulverizing them, when no horse-hoe will have any effect.

Plate X. Fig. 2.

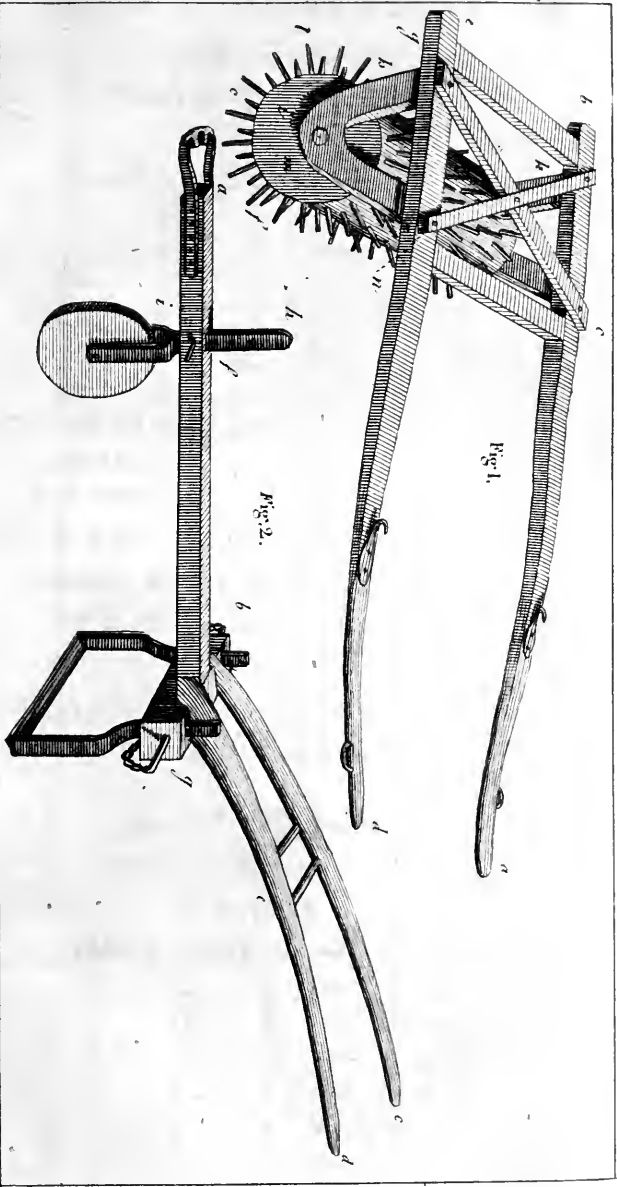
*The Berkshire Shim.*

*References.*

a to c	—	10	0	Feet 0 Inches.
a to b	—	5	4	
c to b	—	4	6	
d to e	—	2	10	
b to g	—	1	7	
a to f	—	1	7	
h to i	—	1	0	

Diameter of the wheel 14 inches.

The



*[The text in this section is extremely faint and illegible due to the quality of the scan. It appears to be a multi-paragraph document.]*

f  
a  
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The share 14 inches long at cutting part, and 10 at top; the bottom 4 inches wide: but shares of any size may be fixed in it.

The block 4 inches thick by 7 inches deep.

The beam 3 inches square, rounded.

As the shim is here represented, it is 2 feet from the top of the block to the ground, and from the top of the beam to the ground, at the wheel, 20 inches.

The share rises or sinks at pleasure through the block, as does the wheel through the beam.

It will not here be improper to remark, that this tool is in *Berkshire* no longer a common one, and that several gentlemen, who had tried it, laid it aside as a bad instrument; which has arisen from not attending sufficiently to the variations of the wheel. Mr. *Arbuthnot* has improved it, by setting the share into the earth, instead of leaving it flat, by which means the effect in cutting is much stronger. He has found a shim of incomparable use in answering the purpose of the hand-hoe, cutting through all the weeds, and leaving them to die in the sun. It is simple, and very expeditious. The price 2/. 3s.

Plate XI. *The double mould-board Plough.*

*References.*

*Fig. I. A perspective view of the Plough.*

A. The share, 22 inches long and 16 inches broad, rising with an angular crest on the middle of its upper surface.

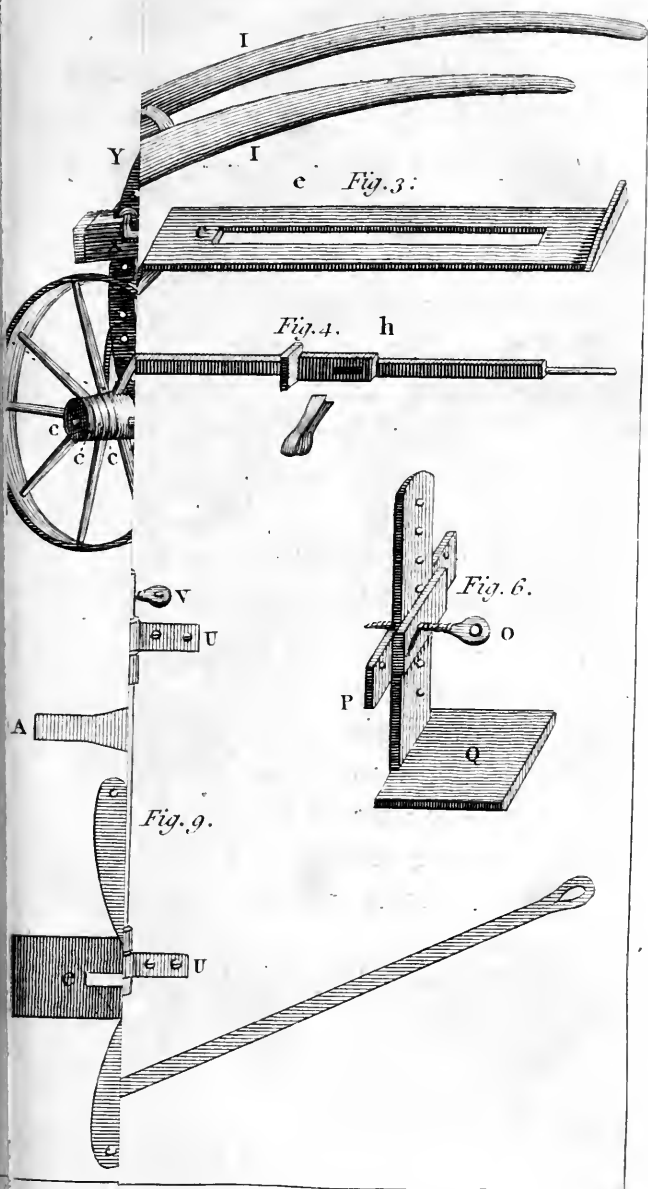
B. The coulter, its extreme length is 3 feet 2 inches, its breadth is 3 inches in the blade, and  $1\frac{1}{2}$  inch in the shank; inclining to the horizon about  $40^\circ$  degrees, and is 4 feet 2 inches distant from the point of the beam to the inner side of the mortise.

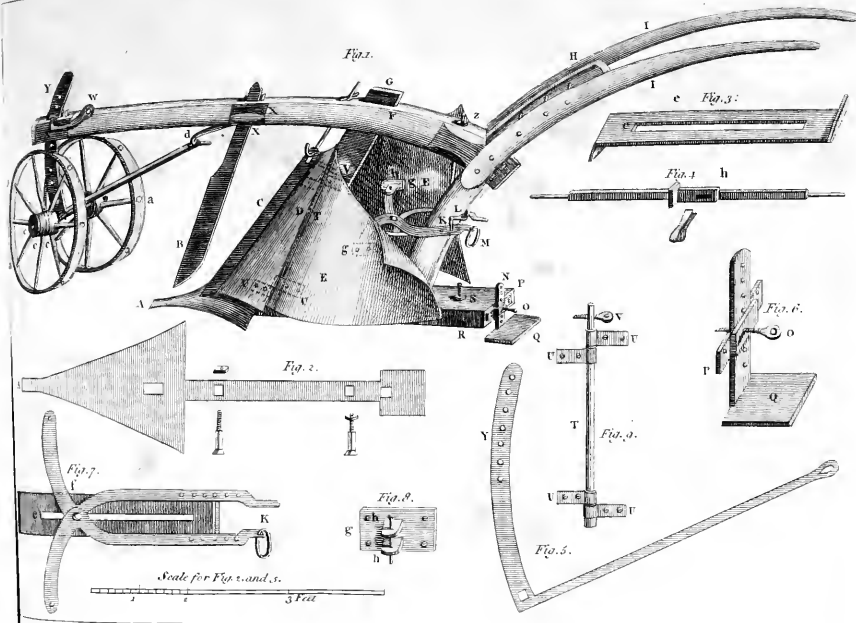
C. The false coulter and tuck, with an iron key or wedge driven through a mortise in the upper end of it.

D. The breast-plate, its height from the share to its upper or angular point is 2 feet, and at its back edge 18 inches; its breadth at the top, is 4 inches, and at the bottom 9 inches, inclining to the horizon about  $45^\circ$  degrees.

E E. The mould-boards, or iron wings, are  $18\frac{1}{2}$  inches broad on the upper ends,  $19\frac{1}{2}$  inches broad at their under ends, and  $\frac{1}{4}$  of an inch thick.

F. The beam, is 6 feet 9 inches long from its fore end to the shoulder of its tenon; the thickness of the beam is  $4\frac{1}{4}$  inches







inches by  $3\frac{1}{4}$  at the shoulder of its tenon, which is inserted into the beam post H. The whole length of the plough from the fore end of the beam to the extremity of its handles is 11 feet  $2\frac{1}{2}$  inches.

G. The sheath, is 2 feet 4 inches long,  $5\frac{1}{2}$  broad, and  $1\frac{1}{2}$  thick; its back edge is  $11\frac{1}{4}$  inches from the shoulder of the beam, inclining to the horizon 40 degrees.

H. The hind sheath is 3 feet  $2\frac{1}{2}$  inches long,  $4\frac{3}{4}$  inches broad, and 3 inches thick; its under end is mortised into the chip, but the beam and handles are fastened to the hind sheath with wooden trundles, wedges, and nails.

I. The handles of the plough, are 2 feet  $8\frac{1}{2}$  inches distant from each other at their points or upper ends.

K. An iron caliper, whose fore ends are fastened with iron pins (see fig. 8) h h, to the inner sides of the mould-boards, or bended iron wings; the outer ends of the caliper are pierced through with holes to receive the hook L, which serves to fix the caliper, &c. to the degree of expansion required.

L. An iron hook fastened to the hind sheath H.

M. An iron ring 3 inches diameter, which passes loosely through a hole in one of the arms of the caliper, and is laid over the other arm to fix the caliper, when the mouldboards are opened to their full extent.

N. The perpendicular shank of the gage plate.

O. A flat headed iron screw, which passing through the staple P, and perpendicular shank of the hind gage, screws into the end of the chip S, and serves occasionally to elevate or depress the gage.

P. A flat staple, which embraces the perpendicular shank of the tail gage, and the flat headed screw O, with which the gage is fixed as need requires.

Q. A horizontal iron plate or gage, 5 inches square, and  $\frac{1}{2}$  inch thick, with a perpendicular shank pierced through with holes to receive the iron screw, with which it is set to a proper degree of elevation for the purpose intended.

R. The chip, is 3 feet 3 inches long,  $5\frac{1}{4}$  broad, and 4 inches thick; the extreme length of the plough from the point of the share A, to the end of the chip R, is 4 feet 4 inches.

S. Two screws and nuts, with which the shank

shank of the share is fastened to the chip.  
 N. B. Only one of the screws and nuts appear in this view of the plough.

T. A round-headed iron bolt, 16 inches long,  $\frac{5}{8}$  of an inch thick, with a hole through its upper end, for a pin or screw to keep it in its place; this bolt passes through the eyes of the four iron plates or hinges, U U U U, which are properly fitted and rivetted to the breast plate and iron wings or mould-boards, and serves as a spindle for them to turn on.

U U, &c. Four iron plates or hinges, 3 inches long,  $2\frac{1}{4}$  broad, and  $\frac{3}{8}$  of an inch thick, rivetted to the breast plate and iron wings.

V. The flat-headed iron pin or screw, which passes through the upper end of the bolt or spindle, to keep it to its place.

W. An iron hook, fastened to the upper side of the beam, and is occasionally set in the holes of the curved gage, to regulate the depth of the furrow.

X X X. Three clamps or iron plates, fastened to the beam, to prevent it from splitting.

Y. An iron gage or regulator, being a segment of a circle, pierced through with holes;

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holes ; this segment is about 2 feet 3 inches long (exclusive of its shank) two inches broad, and  $\frac{1}{4}$  of an inch thick ; its shank is 3 feet 2 inches long, and one inch square, with a hole at its extremity for the hook.

Z. A flat-headed iron bolt or brace, which passes through the chip, beam, and sheath ; it is fastened thereto with a nut and screw, to strengthen the plough.

a a. The carriage wheels, are two feet diameter, and two inches on their periphery.

b. An iron axle-tree, 20  $\frac{1}{2}$  inches long, and 1  $\frac{1}{8}$  of an inch square in the middle, with a small shoulder on each face for the under end of the segment to bear against, to which it is fastened with a feathered bolt or wedge through the axle-tree.

c c c. Three wooden washers, 4 inches diameter, and one inch thick ; the use of these washers is to set the carriage wheels at a greater or less distance from each other, as need requires.

d. An iron hook, which passes through a hole in the end of the shank of the gage, and serves to fix the axle-tree, gage, &c.

to the beam, to which the hook is fastened with a strong wood screw.

e. An iron plate, 14 inches long,  $2\frac{1}{2}$  broad, and  $\frac{3}{8}$  of an inch thick; this plate is fixed in a horizontal position, close under the caliper; its fore end is turned down slanting, and fastened to the sheath G, and its tail end is turned up slanting, and fastened to the sheath H. In the middle of the plate there is an aperture 13 inches long; its use is to guide the iron pin f, and regulate the motion of the caliper, &c. This plate serves also as a brace or stay to the hind and fore sheath.

f. A round-headed iron pin, with which the caliper is connected to the directing plate e; the under end of this pin passing through the aperture in the plate, is thereby directed so as to procure a regular motion to the caliper, mould-boards, &c.

g g. Two iron plates, with two horizontal ears rivetted to each of them. These ears embrace the fore ends of the caliper, and are connected thereto with the iron pin h h. See fig. 8. N. B. The plates are rivetted to the inside of the iron wings or curved mould-boards; but there is only one of them seen in this view of the plough;

plough; the other is indicated by the dotted lines on the outside of the left wing.

h. An iron pin, with which the caliper is connected to the plate, &c. as before mentioned.

A. Fig. 2. The plough share.

e. Fig. 3. The directing iron.

h. Fig. 4. The axis of the carriage wheels.

Y. Fig. 5. The curved gage.

Q. Fig. 6. The hind gage plate; P, the flat staple; O, the flat-headed iron screw.

K. Fig. 7. The caliper; e the directing plate; f the round-headed iron pin, with which the caliper is connected to the directing plate.

g. Fig. 8. A square iron plate with ears, which embrace the fore end of the caliper; h an iron pin, with which the caliper is connected to the ears.

T. Fig. 9. The round-headed iron bolt or spindle, which passes through the hinges u u, &c. V a flat-headed screw, which serves to keep the bolt in its place.

This plough Mr. *Arbutnot* chiefly uses for earthing up plants in rows, and striking furrows. It works in light or well tilled land with two horses, on other occasions

casions with three. The mould-boards expand at pleasure, according to the distance between the rows, and have such a sweep, that they will earth up a row of plants to any degree or height required, even to burying them on the top of an arched ridge.

The variations of depth are equally simple, being by the segment of a circle, which goes vertically through the end of the beam. But as the accuracy of the performance depends on this gage always retaining its exact form, care should be taken in turning on the head-lands, not to throw the plough on one side, as practised with the common wheel plough.

As I have myself used this implement, and with uncommon success, I beg leave to hint, that in various works I have found it of incomparable use: in the operations of horse hoeing, earthing up the rows, it equals the exactest hand work: another use, in which it is peculiarly important, is forming ridges out of fine tilled *flat* lands. If furrows are drawn with a small swing plough, on a level surface at every 4 feet, and the double mould-board goes in them, ridges of that breadth will at once be formed,

arched at will by the degree of expansion in the wings. At 5 or 6 feet the same, only at wide distances it will not *arch*, but leaves a small cavity along the center of the ridge: this is of excellent use for cabbages, &c. the sides to be drawn to the plants by hoeing. I have also used it for drawing water-furrows on well-ploughed land, and find it executes them extremely well.

After two bout ridges are drawn out in half ploughing, with design to finish, this plough does double work in finishing.

The price 8*l.* 18*s.* 6*d.*

The hint taken from a plough constructed by *William Craik*, Esq. of *Arbigland*.

### Plate XII. *The Drill Plough.*

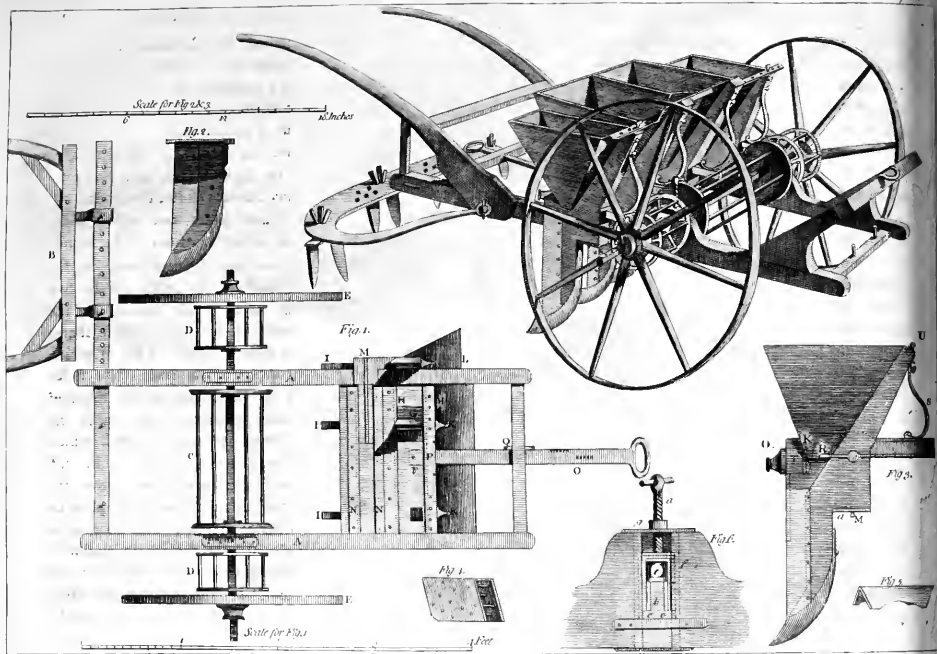
#### *References.*

A. Is the frame of the carriage.

B. The shafts, which are movable on a bar, to suit different sized lands, or hang on occasionally in front, when sowing flat.

C. The great lanthorn wheel; it is 8 inches in diameter, is immovable on the axis, and has 6 staves.





Scale for Fig. 2 & 3  
6 12

Fig. 2.

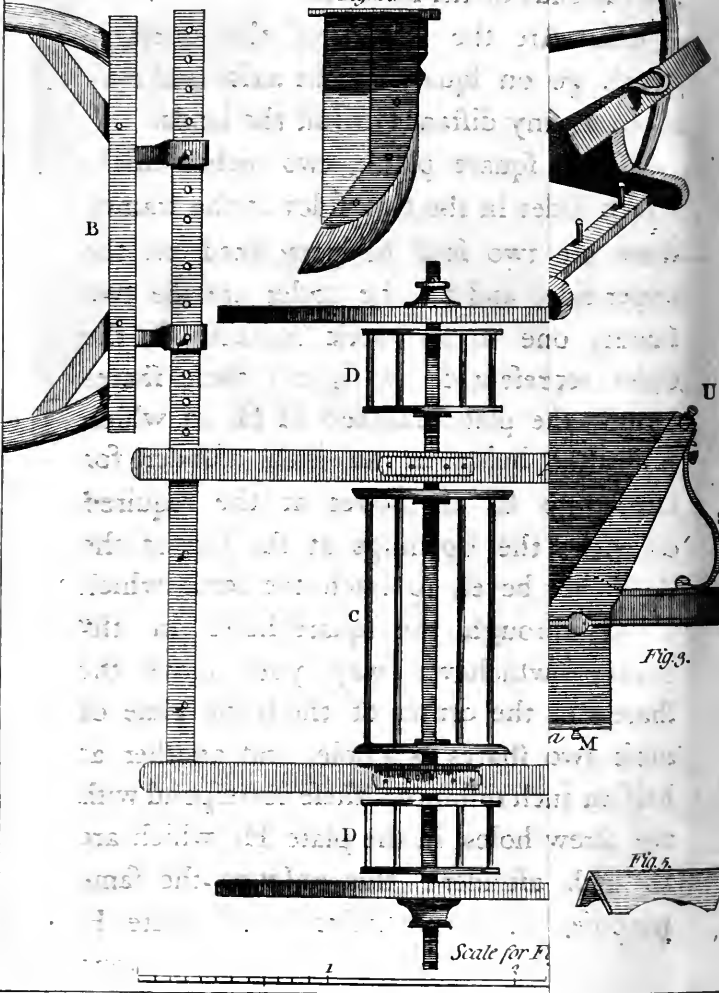


Fig. 3.

Fig. 3.

Scale for Fig. 2 & 3

DD. Are two of equal diameters, which may be taken off when only two hoppers are wanted; they have likewise six staves: these three wheels turn with the axis, and lift the ends of the levers I.

EE. Are the wheels of the carriage, which go on square on the axis, and may be set at any distance to suit the lands.

F. Is a square plank, two inches thick, which slides in the two sides of the frame; there are two seed hoppers fixed on the upper side, and on the under are the two shares, one in its work marked G, the other represented by fig. 2: these shares slide in the plates marked H H, in which there are holes at an inch asunder for screws, to fix the shares at the required distance; the openings at the top of the shares are bevel, to catch the seed, which comes through the square holes in the plank, whichever way you move the share; in the center of the front plate of these two shares is a hole, and another at half an inch distance: these correspond with the screw holes in the plate H, which are an inch asunder: this answers the same purpose, as if the holes in the plate H were

were only half an inch asunder, which would have weakened that plate.

II. Are the levers, which are fixed by a center pin in the hoppers, as represented in fig. 3; these ends are lifted up by the staves of the lanthorn wheels, which consequently lower the tongue R, to deliver the feed; these tongues work against a brush K, which is set at the distance suitable to the size of the grain.

L. Is one of the side hoppers, to which the share is fixed, and which has an iron plate M fixed at the bottom, which slides in the plates N N. In the plate M, there are three holes, at an inch and a half asunder, for a screw to fix it at the proper distance: thus, when each of the middle shares is shifted half an inch, the outward ones are shifted an inch and half, which keeps them all at equal distances.

O. Is an iron bar, fixed into the plank at P; it goes through the end rail of the frame, and serves to move the plank with the hopper forward, to set it into work, and to draw it out of work at the ends of the lands; the six holes are gages to ascertain the quantity of seed to be sown; a  
pin

pin is fixed into either of them, which stops against the rail, when the spring Q, on the other side of the rail, catches in the corresponding notch; the further the hoppers are advanced to the wheel, the more seed is delivered, as the levers I are lifted higher by the staves of the lanthorn wheels.

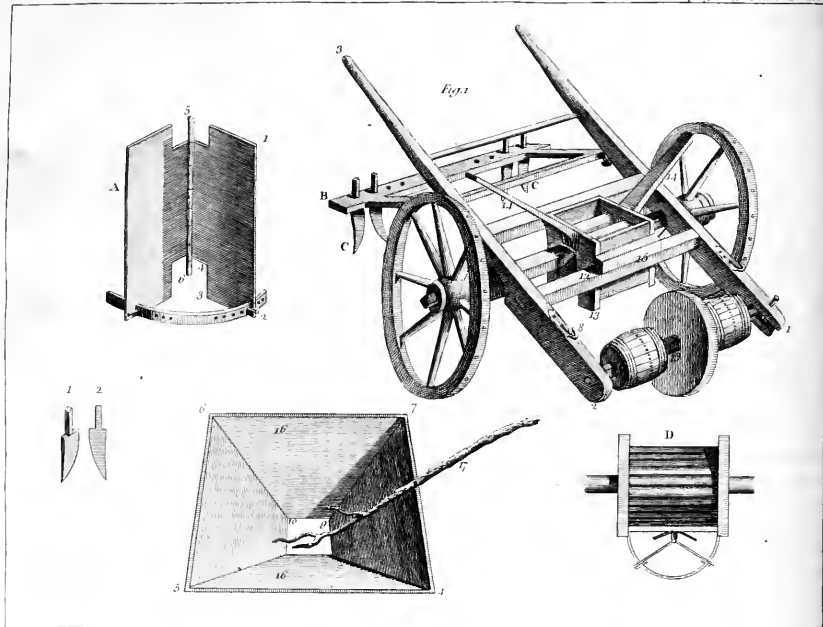
Fig. 3. is one of the outside hoppers, with the share fastened to it, all which slide together on the plate M. R is the tongue, which lets out the seed, when the end I is lifted up, and closes the bottom of the hopper, when forced down again by the spring S. K is the brush, against which the tongue works; the elasticity of the bristles prevents stoppage or bruising of the grain; it is set by the gage screw T, according to the size of the grain. U is a screw, which goes through the iron bar, that secures the hoppers at the distance they are set.

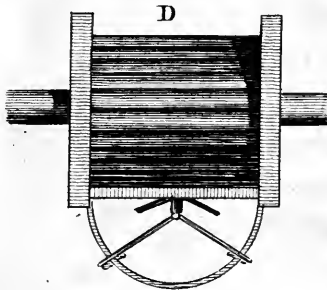
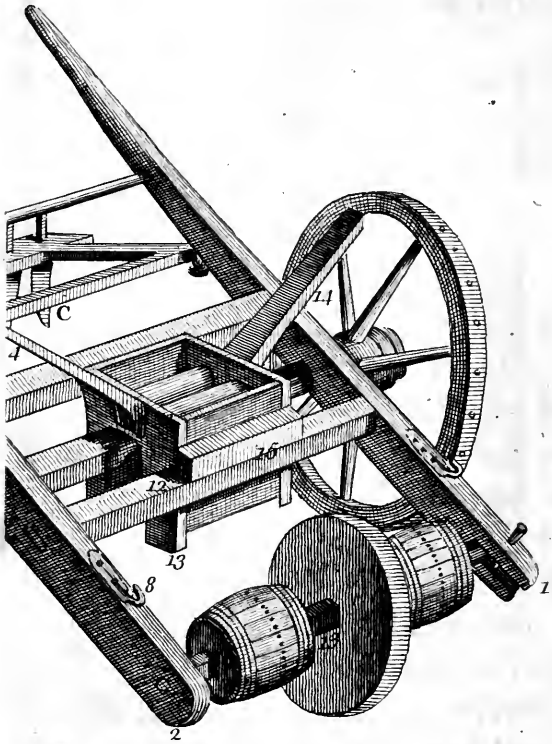
Fig. 4. is an iron box, with wires fastened in it, which intersect each other; these are occasionally put into the shares, when wheat is sown, to disperse the grain, and prevent its falling in lumps.

Fig. 5. is a triangular piece of wood, hollow underneath, and on the sides; it is

placed in the hopper, a little above the tongue ; this suffers the feed to sink gradually, and prevents its laying too heavy, which often makes it arch at the bottom of the hopper ; and being hollow at bottom, there is room for the feed to rise by the spring of the lever : thus the feed is kept in motion, and is delivered more equally.

Fig. 6. is a sliding box, which raises or sinks the wheels to sow deep or shallow. *a* is a screw rivetted at bottom, to the top of the frame *b*, which slides up and down in two grooves *c c*. *d* is the axle of the wheel, which runs in the box *e*, and is fastened in by the pin *f*; this was necessary to get the axle into the box, as it is shouldered on each side, to prevent its sliding either way : the screw *a* works in the nut *g* to raise or sink the whole.







## Plate XIII.

*The Turnip Drill, with a manure Hopper.**References.*

1 to 2	—	2 Feet 6 Inches.
2 to 3	—	6 2
4 to 5	—	2 10
5 to 6	—	2 10
7 to 9	—	1 8
9 to 10	—	0 10 $\frac{1}{2}$
11 to 12	—	0 4
11 to 13	—	1 0
2 to 8	—	0 11

17 A movable stick, with a forked end for stirring the manure, in case of choaking.

The cags, or little barrels, 9 inches long, and 6 diameter, movable on the axis 13.

The front wheels 15  $\frac{1}{2}$  inches diameter: and 2 inches thick.

The hopper is supported by the brace 14 14, and fixed by the peg 16 16.

The wheels 30 inches diameter.

The box 15 is 10  $\frac{1}{2}$  inches square, and contains a fluted roller of wood, 8 inches diameter, turned by the axis of the wheels, and delivers the manure, which would fall perpendicularly, were it not for two small boards, which expand at pleasure by a hinge, which throws the manure over the rows. See A.

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1 to 2 — 1 Foot  $\frac{1}{2}$  Inch.

2 to 3 — 0 4  $\frac{1}{2}$

3 to 4 — 0 3

5 to 6 — 0 10 This is an iron spindle running through the hinge to fix to the bottom of the box 15.

B. Represents the harrow, which is hung on behind.

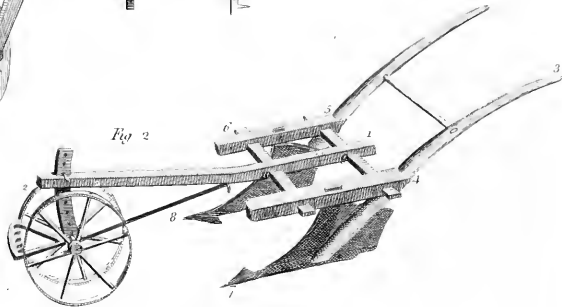
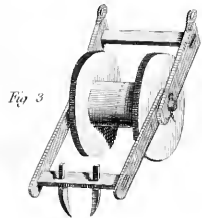
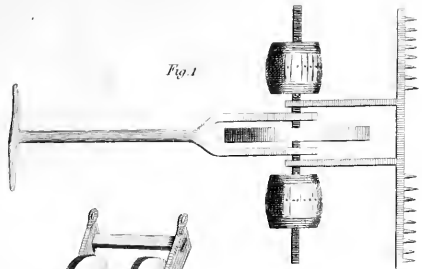
C. The teeth; 1 1 a front view; (2) an oblique view of one.

D. A representation of the roller in profile, and A fixed for use.

The great use of this implement, which is perhaps one of the most simple ever invented, is to deposit the manure directly on the turnip or lucerne seed, not by way of enriching the land, but to quicken the growth while young, just sufficient to enable the plant to escape the fly. A small quantity laid directly on the seed thus, answers a very large dressing in the common manner. The proper manures are soot, malt-dust, all sorts of ashes, lime, dung rotted to powder, pigeon's dung, &c. \*

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\* The hint of delivering the manure taken from a drill plough invented by Dr. Gale, of New England, improved only in the variation of the distances.



In the types for 2. Reference to 3 say 1 to 2.

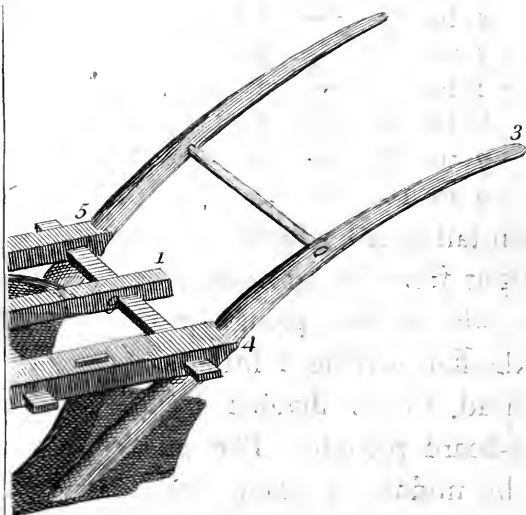


Plate XIV. Fig. 1.

*The Turnip Drill.*

This tool, which for simplicity in the invention has infinite merit, is used on land that is worked very fine ready for turnip seed, and is drawn by a man or boy along the top of each ridge, or on the flat, at pleasure. It is unnecessary to observe, that it is cheap, easily repaired, or even made by a ploughman, and performs accurately and well.

Plate XIV. Fig. 2. *The Double Plough.*

*References.*

1 to 3	—	6 Feet 3 Inches.
3 to 4	—	3 8
4 to 5	—	2 0
6 to 2	—	3 2
7 to 8	—	2 2
9 to 10	—	2 2

From tail to tail 1 foot.

Height from the ground 18 inches.

The use of this plough is to head up from the flat, leaving a little space between each head, to be divided by the double mould-board plough. The advantage is, that the middle of these narrow lands, which is the best of the field, and which ought to be in the lightest condition, is

L 1 3            trampled

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trampled by the horses in backing up the first furrow in the common method.

Two horses work it completely, doing double the work of common ploughs.

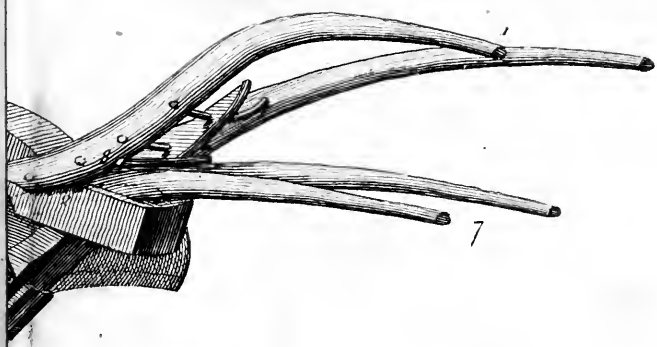
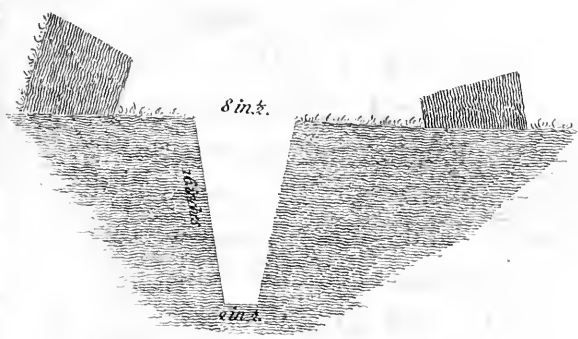
Plate XIV. Fig. III.

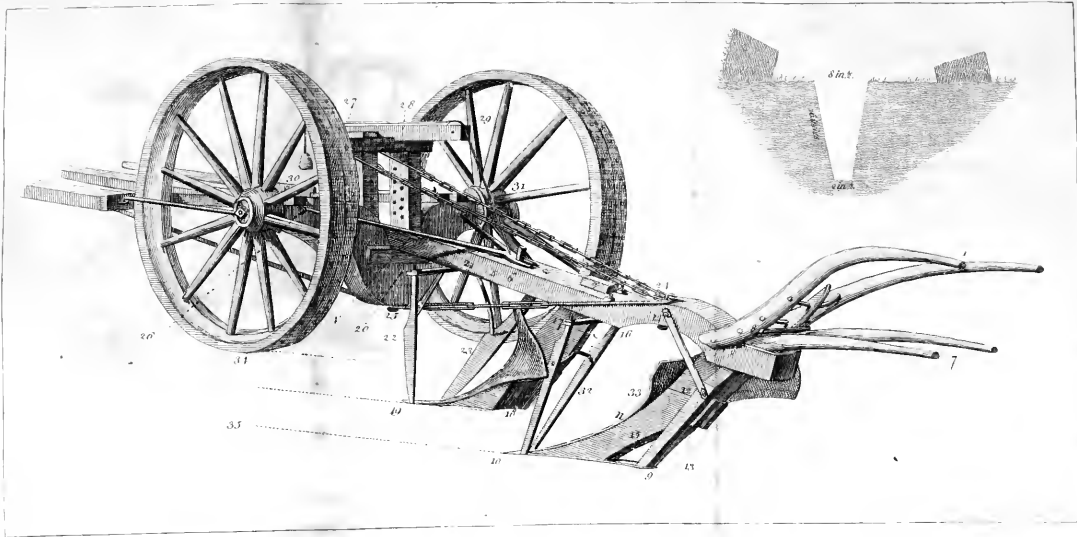
A small barrel drill, which fixes to the tail of any plough, and delivers turnip feed; the simplicity of the construction, its cheapness, and other circumstances render it of more than common value.

Plate XV. *The Drain Plough.*

### *References.*

1 to 2	—	5 Feet 0 Inches.
2 to 3	—	2 6
3 to 4	—	4 6
4 to 5	—	2 2
5 to 6	—	0 7
7 to 8	—	2 10
2 to 9	—	2 6
9 to 10	—	2 6
10 to 11	—	1 3
11 to 12	—	1 8
13 to 14	—	1 8
11 to 15	—	0 9
10 to 16	—	2 6
16 to 17	—	1 2
18 to 19	—	1 8
19 to 20	—	1 11
20 to 21	—	1 9
22 to 23	—	1 0
24 to 25	—	5 8







5 to 26	—	2	4
26 to 27	—	1	5
27 to 28	—	1	0
27 to 29	—	3	0
30 to 31	—	3	6
25 to the beam			
hole bottom	0		6
32 to 33	—	1	7
34 to 35	—	1	4

The lower share  $2\frac{1}{2}$  inches wide; the upper one 6.

The beam at 24, is 5 inches square; and the same, but rounded to 4 inches, at 4.

Standards of the gallows, 6 inches by 3.

Wheels, 5 feet diameter.

This machine cuts the drain 16 inches deep at one stroke, on grass or clover, and requires no cleaning after it, but accidentally; wants no furrows to be drawn out for it to work in; delivers the turf 8 inches thick on one side of the trench, and the other 8 inches on the other side, which of course facilitates the work in covering in: it requires 8 strong horses, 1 holder, and 2 drivers; leaves the drain cut in a cleaner and more regular manner than possible for a spade; and if the ground is strong, brings up the bottom of the furrows in as regular a form as if cast in a mould; and the turf being

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regularly turned in one piece of equal thickness and dimensions, makes the covering particularly expeditious.

Among other trials of its performance, six acres were drained in 3 hours,  $1\frac{1}{2}$  rod afunder, which amounted to 720 rods, or 1920 in the day's work of 8 hours, with 12 horses; but it is to be observed, that by giving wheels of 5 feet, Mr. *Arbuthnot* finds 8 horses just as effectual as the 12. The following sketch will shew the expence.

Twelve horses and 3 men, accord-

ing to the price of the country, £. 1 10 0

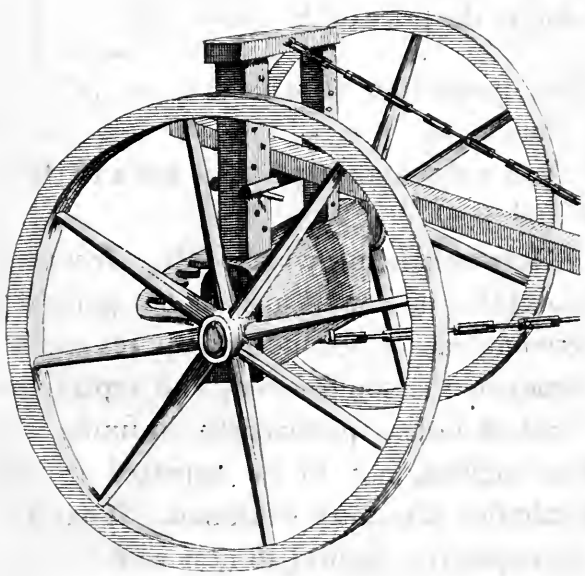
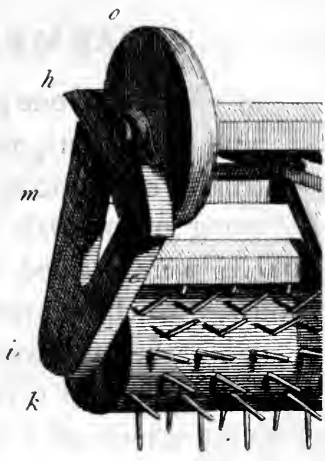
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The proportion of which, in 3

hours, is, - - - 0 11 3

720 rods, at that price, is not a farthing a rod.

Notwithstanding which, Mr. *Arbuthnot* thinks this is not a tool to be generally recommended; because it requires an accuracy in the construction, and reparation, if out of order, particularly in fixing the four coulter; not to be expected in the generality of country workmen. That it is also expensive, coming to near 20/.



1790

up to the top

of the

of

of

of

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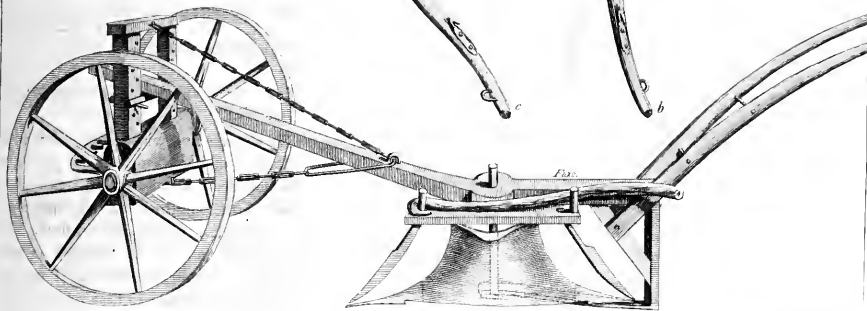
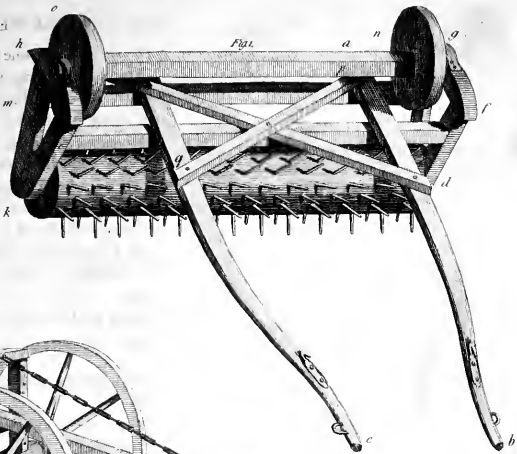


Plate XVI. Fig. 1.

*The spiky Roller.*

*References.*

a to b	—	12 Feet 0 Inches.
b to d	—	7 3
g to f	—	3 6
g to e	—	2 0
n to o	—	6 9
h. to i	—	2 2
e to m	—	2 4
p to q	—	6 10
b to c	—	2 6

The square of the end braces g, h, 4 inches by 7  $\frac{1}{2}$ .

Ditto of the standards e, m, 3 by 7.

Length of the cylinder, 7 feet 6 inches,

The wheel axle, 5  $\frac{1}{2}$  inches square.

Diameter of the cylinder, 18 inches.

Ditto of the wheels, 12 inches.

The shafts at q are 3 inches by 5.

The cross bars, 3  $\frac{1}{2}$  inches and 4.

256 Teeth, which weigh 512 lb.

However rough a fallow may be, the spiky roller will reduce it at twice going; five horses and one man do 6 acres a day, once in a place; it will be perfectly effectual when harrows or drags have no effect. Clods may be left to roast for destruction of root weeds, with certainty

that they may be at any time reduced to pulverization. The only caution to be observed in its use is, that it must never go on the ground till perfectly dry. Mr. *Arbutnot* under that circumstance never knew an instance of any mould adhering to it, but on the contrary, when by chance it has been carried on too soon, it immediately clogs.

Plate XVI. Fig. 2.

*The Turnwrest Plough.*

This is an idea of Mr. *Arbutnot's*: it has not yet been executed, but he intends it as soon as his numerous avocations will allow him time. His objection to all the common turnwrests is the necessity there is of the share being so narrow that it cannot cut the furrow; and the impossibility of fixing a proper mould-board; both which objections will be here obviated.

This gentleman having, as the reader may judge from the preceding implements, given uncommon attention to the construction of all sorts of ploughs, I was very desirous of having him lay down explicit rules for the instruction of wheel-wrights in building a common plough; on requesting him to explain his ideas on this subject, he was obliging enough to draw  
up

up the following paper, accompanied with several very accurate drawings: I insert it here with the utmost satisfaction, under the firm conviction, that so clear and decisive an account of the principles of constructing a plough never yet was laid before the publick.

As different counties have adopted ploughs of different constructions, seemingly more from chance, than the expediency of soil, or other circumstances, I shall in the following essay endeavour to explain the principles on which the swing and wheel-ploughs should be constructed to the greatest advantage, and shew, wherein the management of the one essentially differs from the other.

Secondly, I shall attempt to prove in which part of the plough the point of resistance is, from which the different lines of traction must tend to the horses shoulders, in different operations, and soils; and by explaining, wherein the direction of the line of draught to the wheel-plough differs from that of the swing-plough, prove the superior advantage of the wheel-plough, where the nature of the soil will admit the use of it.

Thirdly, I shall describe the form of the share and sweep of the breast and mould-board, which have appeared to me most likely to diminish the friction and adhesion of the earth on this useful but as yet imperfect machine.

Lastly, I shall attempt to give an easy mechanical rule to wheelwrights, by which they may lay down a plan for any form of a plough, which their most inferior workmen may execute,  
and

and which will likewise enable them to preserve the form and proportions of any plough they are ordered to copy, though the plough should be required to be of different dimensions.

I shall only further observe, that what I shall advance, is founded on experiments prosecuted with the greatest attention.

I shall begin with the swing-plough, which is poised by two levers; the one of which is the handle, and acts as a lever of the first kind, the fulcrum being at the heel of the plough, between the power at the handles, and the weight on the share. The other lever is the beam, which is of the second kind; the end of the beam being the point where the power is applied, the weight being on the share, and the heel of the plough the fulcrum. When these powers are properly applied, the swing-plough is a very good instrument; and in the hands of ploughmen, who are used to observe the proper æquilibrium, will perform its work to any reasonable depth.

As in the circumstance of the weight being on the share, I differ in opinion from a very ingenious author, the Rev. Mr. *Dickson*, it is necessary I should give my reasons, and the proofs whereon they are founded, more especially as the length of the beam and handles, and application of the draught, entirely depend on this proposition, as will appear hereafter fully explained, in ascertaining the line of traction.

I do not pretend to say, that the natural center of gravity of the plough is on the share; but when I consider the additional weight of the part of the furrow to be lifted, though separately the center of gravity of each is in a different point, yet when they become one body, they must have a common center of gravity, which,  
in



in my opinion, must be in a perpendicular line, nearer the point of the share, than when the plough was a body by itself.

And when I further consider, that the power of cohesion in the body to be lifted is much greater than its gravity, and that the separation of such body is first to be effected by the point of the share; and further, that the resistance of the earth against the coulter, which is very considerable, is above the point of the share; I cannot but believe, that, in proportion to the solidity of the body to be separated, the weight and resistance is advanced nearly towards, if not quite to that point. This seems to be confirmed by practice; for, when ploughing in loam, if the point of the share touches on clay, the plough will immediately suck into the ground, and sometimes require the whole weight of the ploughman on the handles to prise it up. But to satisfy myself as to the fact, I have often (when my plough has been working to my mind) stopped the horses suddenly, and then fixing a stick in the ground, to the height of the tug at the horse's shoulder, and removing the earth from above the share, without altering the position of the plough, I always found, that a line extended from the top of the stick to the point of the share, intersected the notch of the crosse to which the draught was fixed.

But as the stooping of the horse, when at his pull, will lower those ends of the draught chains, and the other ends being fixed to the beam will carry the direction of the line of traction a little backward, I will not contend, that the draught is immediately from the point of the share, but from a point an inch or two behind it; however, from the above mentioned experi-

experiment, I should be induced to call that point, the center of resistance, nor do I conceive that the center of gravity of a plough can be in any point of the line of traction, though I believe in the combined weights of the plough and earth, their common center of gravity is near it, at least on some part of the share; for as that part of the furrow, which is supported on the mould-board, is on a much more inclined surface, than that part of the furrow, which rests on the more horizontal surface of the share, their centers of gravity distinctly must fall in different lines, and indeed the lateral surface of the board rises so suddenly, that the center of gravity of that part of the mould must soon be out of a line with the plough, consequently the medium of the weight of earth, is probably pretty forward on the share; but as I mentioned before, the power of cohesion being greater than the weight, in my opinion puts it beyond a doubt.

That the length of the handle, which is the long arm of the bended lever, should be to the length of the bottom of the plough, which is the short arm, as the weight on the share, and tendency of the point into the ground, are to the power, which is applied at the handle, is self-evident, and it is made so by most wheelwrights. But I cannot say, that the other part of the plough, which constitutes the lever of the second kind, has been so well considered and attended to, though it is by far the most essential: first, as the application of it is not solely to the strongest power of the horse, which is that of drawing, but partly to his power of lifting. For when the line of draught is nearly parallel to the plane whereon the horse goes, he will draw a much greater proportion of his weight, than he

can carry. Hence it appears, that the proper length of this lever requires the greatest attention; but the other, provided it is long enough, cannot be amiss, as the whole weight of the ploughman is the required power at the utmost.

The only rule I have been able to lay down, is, that a line drawn from the tug at the horse's shoulder to the point of the share, should intersect the notch in the copse immediately below the end of the beam, as that pitch admits of the most variations; it must be observed, that the tug at the shoulder of a full-sized horse is about four feet four inches from the ground, and the length of chains necessary for him to work freely about nine feet; but, as I said before, when the horse sinks to his pull, I think it must necessarily carry the line of traction to a point behind the point of the share; but it is scarcely possible to ascertain the immediate spot on the share, from the difficulty of measuring the height of the tug at the horse's shoulder, when he is in motion. However it is self-evident, that in proportion to the sinking of the horse, as the draught chains are fixed to an inflexible beam, the direction of the line of traction will be carried backward; but, as the center of resistance can lay but in one point, the ploughman will immediately be sensible of the alteration, and if only an accidental sinking of the horse, will remedy it by pressing on the handles; if the natural disposition of the horse is to sink to the draught, he will alter the direction of the line of traction, by lowering the draught at the end of the beam.

I have given the above direction to my wheelwrights, and they find it answers; but, as the different heights of horses, and the different applications

applications of the draught, being single or double, will make a great alteration in the line of traction; that is, when one horse goes on the land, and the other in the furrow, the line of traction will be as if both horses were on a surface half the depth of the furrow; and when the horses go at length, viz. one before the other, the angle of traction of the foremost horse with the ground will be more acute than the angle of traction from the hindmost or thill horse; therefore an intermediate angle must be found. And further, as the different nature of soils, in which the plough works, will make an alteration in the above rule, it is necessary to fix a copse at the end of the beam to raise or lower the draught, and give the plough land or not: the use of which is so well understood, that a description of it would be needless, was it not in the first place to prove, how much the cat-head used in *Suffolk* is superior to every other kind of copse; and in the second place, to point out the error of many ploughmen in their application of the draught, when horses go at length. Fig. 1, plate XVII. is the cat-head, with the copse fixed to it. Fig. 2, is the side view of the copse belonging to the cat-head. Fig. 3, is the common copse. Fig. 4, is a copse used in some parts of *Yorkshire*. Plate XVIII. fig. 1, is a plough in its work, with the different lines of traction necessary to be observed in the application of the draught, which shews the necessity of ascertaining the point of resistance, as on that depends the position of the beam. AB is the beam of the plough, six feet long, having a copse extending three inches beyond it, and eight inches deep. The under part of the end of the beam at B, 14 inches from the bottom of the furrow.

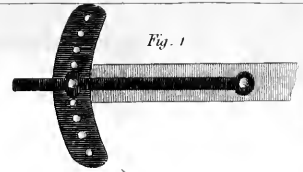


Fig. 1

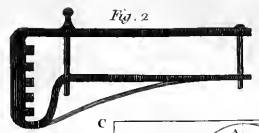


Fig. 2



Fig. 3



Fig. 4



Fig. 5

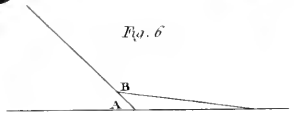


Fig. 6

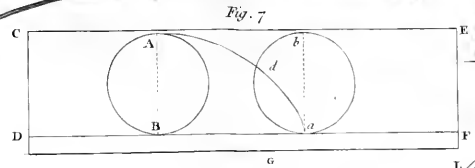


Fig. 7

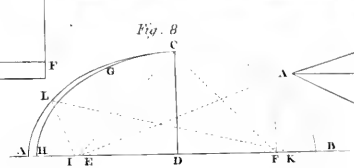


Fig. 8

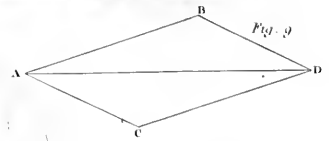


Fig. 9

Fig. 10

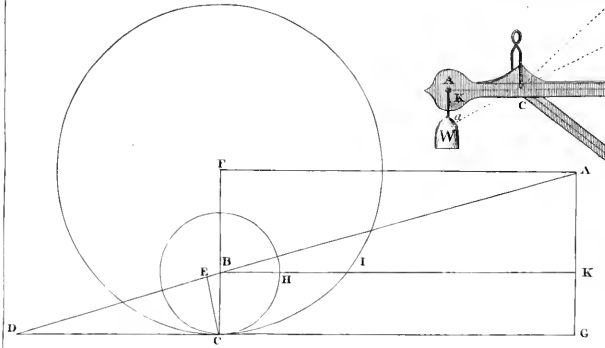


Fig. 11

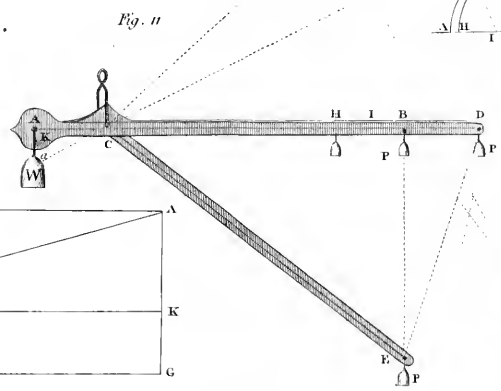
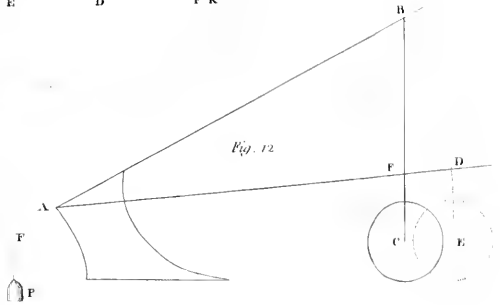
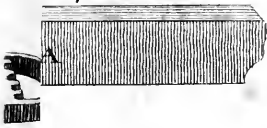


Fig. 12



7. 4



*Fig.*

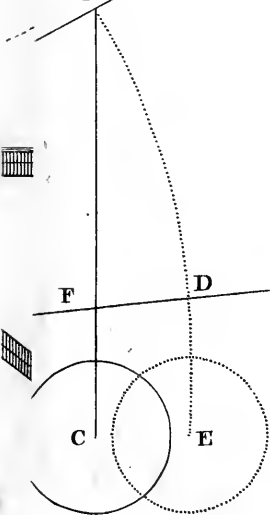


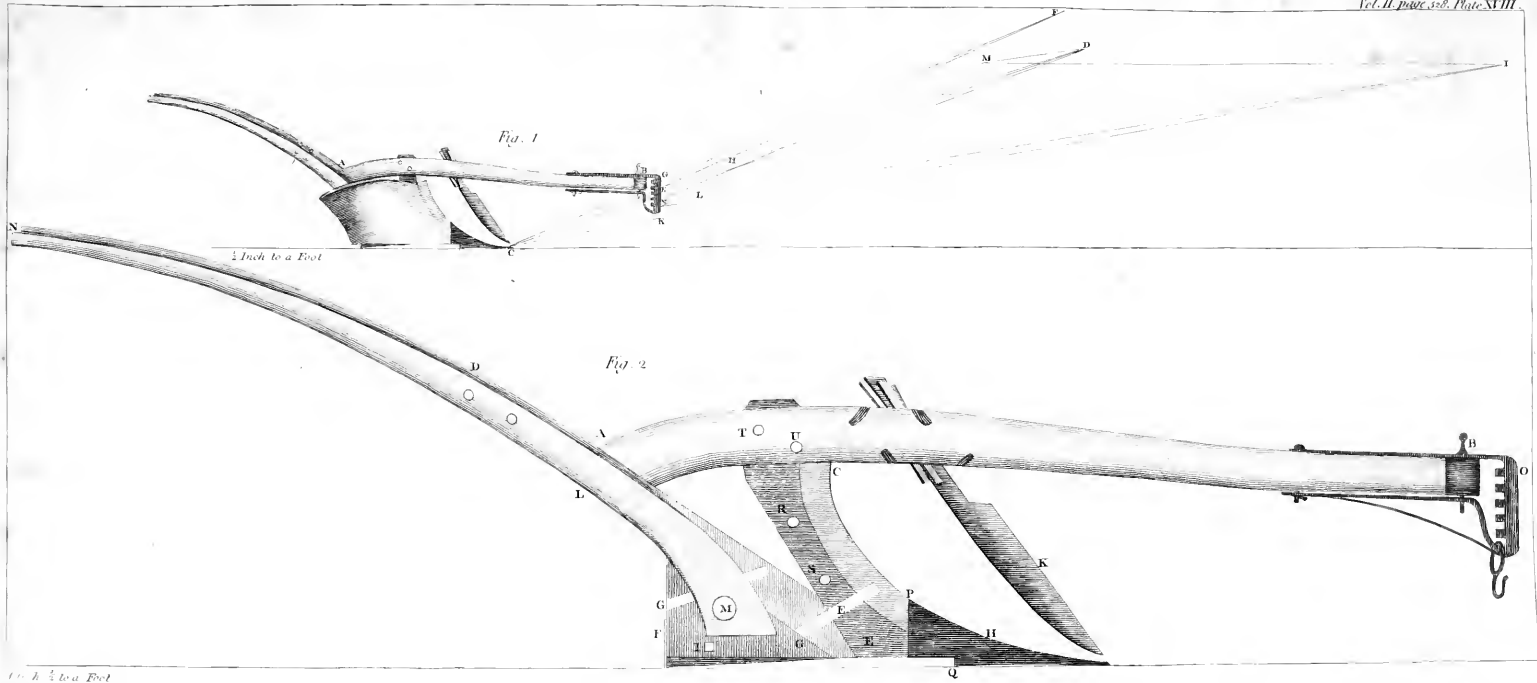
**B**

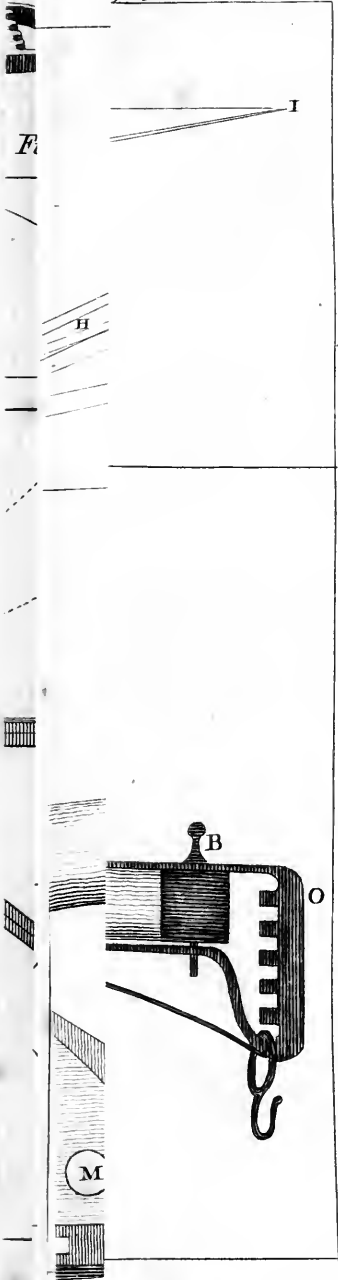
*Fig. 9*



**B**









furrow. C the point of the share, 2 feet 10 inches distant from the under part of the end of the beam at B. D is the point of the horse's shoulder, about four feet four inches high; the distance from that point to the end of the beam, for a full-sized horse, will be about nine feet; if the horse stands in the furrow, the line of traction, C D, will intersect the copse at the notch E, about two inches below the end of the beam; but if the horse stands on the land, his shoulder will be at F, and the line C F will intersect at G. Thus, when horses go abreast, the draught must be fixed between E G at H; but, if the horses go one before the other, the line of traction, from the foremost horse's shoulder at I, (which will be full eight feet six inches beyond the tug of the thill-horse) will cut below the copse at K; consequently the lines of traction D C and I C must be united in one draught at L, bringing the chains from the foremost horse to the whipping at L, the same as from D. This is undoubtedly the method in which the draught ought to be applied: but the usual custom is to raise the chains of the thill-horse up to M, level with his shoulder, and often higher, by shortening the ridger, which is a short chain that goes over the horse's back; the only use of which ought to be, to support the chains from hanging so low, as that the horse may get his legs over them; but they shorten it to raise the beam of the plough, making the angle D M C, and letting the foremost horse draw from the chains of the thill-horse, in the line I M; without considering, as I said before, that it is not only applying the power to the weakest part of the horse, but also that, by making an angle in the line of traction, the weight on the thill-horse's

back is increased, in proportion to the draught of the horses that are before him. By this method it is evident, that the whole weight of the draft of the plough is supported by the thill-horse; and though a horse cannot continue to work under above one third of his weight, he is often obliged to support the weight of the draft of four strong horses, each of which can draw more than one third of his weight: the consequence is, that the thill-horses never put their shoulders to the collar; learning by habit, that their share of the labour is to carry the weight, and that sometimes so intolerable a one, that you will see them reel in the furrow. I have dwelled longer on this subject, to convince gentlemen, who engage in farming, how necessary it is that they attend to the mechanical minutiae of their instruments and labour. Having explained the necessity of making the alterations of the draught at the copse, the cat-head above described will appear much more useful than the common one. See fig. 3, plate XVII. which moves upon a center pin at A, and is fixed to its pitch by the movable pin B, which requiring to be keyed in, that the pin may not be lost, it is so much trouble to the ploughman to make any alteration, that he always is careful to give the plough too much depth, at the same time shortening the ridger, in the manner explained above, fixing the draught as low as the notch at N, plate XIII. By this means, one power counteracts the other, at the expence of an additional horse, almost useless in the team; the only alteration the ploughman makes, as to the depth, is by taking up or letting out a link in the ridger. Bad as this copse is, it is still preferable to the *Yorkshire* one, (see fig. 4, plate

plate XVII.) which swings up and down upon the fixed pin A, not admitting of any alteration as to depth; therefore answers no better purpose than if the chains were fastened to the beam at A. As to the method of notching the plough in or out of land, the one answers the purpose as well as the other.

As the perfection of the swing plough depends on so great a nicety, it is continually liable to be out of order. For example, if the point of the share be made longer or shorter by new laying, or is set down either too deep, or not deep enough, the plough will not go well. This indeed a skilful ploughman will in some degree rectify, by an alteration in the geers. The best method is, as I have said before, by raising or lowering the draught at the copse; but if it requires so much alteration, that the depth of the copse will not admit of it, the next best is by lengthening or shortening the traces, which will alter the angle of traction; and this shews, that the length of the traces should be more attended to than I believe it generally is. When a plough is well pitched, the shorter the traces the better, so as that the horse can but work. If the traces will not admit of being shortened, the only method left is to shorten the ridger; but this is so very improper, that it is absolutely necessary, that the plough irons should be kept in such order, as never to require this last operation. The method I take to prevent my share being altered from the first form, when sent to be new laid by the smith, is, that the land side of the share is continued the whole length of the bottom of the plough, and when applied to the pattern I have given him to work by, he has the complete form of the bottom of the plough,

and can make no alteration, unless wilfully; neither can the ploughman set the point up or down, or in or out of land, the whole going on at once, and fixed by a bolt at the heel. See fig. 5, plate XVII.

The next part to be considered is the mould-board, about which people differ much in opinion, as to the shape of the breast, and sweep of the board. I have paid great attention to these, and do confess each has its peculiar merit, in the hands of different ploughmen, in particular operations. I prefer the curved board, as being most generally useful. The one most common in use is the straight board, with the breast straight and sharp, making an angle, fig. 6, plate XVII, A, of about 53 degrees with the bottom of the plough; and another, B, of 137 with the upper plane of the share on the land side. This last angle is evidently a fault in the plough, as appears by its being filled up with earth by the time it has gone through a few furrows; which filling up proves the form it ought to be of, namely, that this angle ought to be filled up with wood or iron, as the friction or stickage of the earth on such smooth surface will be much less than on the earth, which has filled up the cavity.

Another evident fault in the straight mould-board is pointed out by the earth's wearing a hollow in the breast, nearly similar to the sweep of the *Rotheram* board. This shews that *that* part is as much too full, as the bottom of the breast, at the setting on of the share, is too hollow. Indeed, I do not know a better practical rule to finish the sweep of a board, than by working the plough some days before it is plated, as the earth will wear off those parts that project

ject too much, and fill up the hollows that ought not to be; which last circumstance should be attended to in plating the mould-board: not but that in some instances the wooden mould-board is preferable to the plated one, particularly when working in strong land, when there is too much moisture in it, which must sometimes be the case in seed time, as at that season farmers cannot command their time as in breaking up or fallowing. The reason I take to be this, that the wood imbibes a due quantity of water; thus the surface of the wood being always wet, the stickage or adhesion of the earth is not so great as on the iron, which cannot admit the water; but the wooden mould-board wears out so soon, and the expence of the curved board is so great, that the inconvenience attending the iron plate must be dispensed with.

A further great objection to the straight board is, that it is necessarily too wide at heel, and consequently acts like a continued wedge. I mean the common *English* plough with the straight mould-board; the *Scotch* one described by Mr. *Dickson*, is evidently better, as it has the wrest raised so as to make an angle with the plane of the horizon, from the buck of the share to the heel: whereas the *English* wrest is parallel to the plane. To remedy the inconvenience that arises from this form in the *English* plough, they hold it over on the land-side; otherwise, in strong work, they could not get it through the ground. This subjects them to wrest-baulk the land, which is acknowledged to be a very great fault in ploughing, as part of the under surface of the land is not moved. But an intelligent ploughman will rectify this, by setting down the fin of his share. However, this depends on his care, occasions loss of time, and is attended with expence in altering the irons.

Another inconvenience attending this method of holding the plough on the land-side is the increase of friction, by so much as the quantity of earth always sliding on the board is greater. The only advantage it seems to have beyond that of the curved-board is, that, by holding it on the land-side, when striking up the last furrow, it will have more hold of the ground, therefore not so liable to strike at heel: by this means it will throw up a furrow, that the *Rotheram* will not do, when held in that direction; as the breast of the last, which is hollowed out, then becomes a more horizontal surface, and carries the furrow; which shews, that the *Rotheram* should always be held upright, and it will then perform this last operation quite as well as the other, provided the crumb-furrow is taken close to the adjoining land. On the whole, in my opinion, there are many disadvantages, and not one real advantage, attending the straight board. In this, I have not only my own practice to confirm me in my opinion, but also that of some neighbouring farmers, who frequently borrow my ploughs to break up ground, which they cannot do with their own. This last circumstance is no small proof of the preference of the curved mould-board.

My plough differs some little matter from the *Rotheram*, though I took some hints from it: for as it was obvious that the angle at the setting-on of the share was a fault, I preferred it to the *Suffolk*; which otherwise is a good little plough in light land, but has not length enough to go steady in our strong land. The weight on the share being so near the fulcrum at the heel, the least pressure on the handles or jerk of the horse will raise it.

From the shape of the *Rotheram*, I was led to believe, that the segment of a circle must be the  
true

true shape. But I found it necessary to take the segment of a large circle, in order to obtain an easy admission into the ground: but this carried the mould too high on the breast. It then occurred to me, that a semi-cycloid was the proper shape; the bottom of which, being so much less steep than that of a circular arc, will enter more easily and freely into the ground. As this kind of wedge moves the earth only on one side, it will act on the body of earth lifted, in proportion of its length to its thickness; and the upper part, being so much steeper, will turn off the mould so much sooner than the last-mentioned segment, but not so suddenly as the plough in general use, and therefore will raise the furrow so much easier, as the turning it off is slower. I made one of the size of the *Rotheram*: the sweep of the breast was described by a generating circle of sixteen inches diameter; it performed the work much better than any plough I had ever seen; but trying it in very loose mould, I perceived some earth would now and then lodge in the throat: this induced me to make another, the sweep of which was the half of a semi-ellipsis, whose semi-conjugate diameter was likewise sixteen inches: thus the pitch of both was exactly the same. In the last mentioned circumstance, this seemed to have the preference; but as each of them have their peculiar properties, and both of them are preferable to any plough I have yet seen, I shall give a description of each, observing, that if either of them is approved, it will have the advantage of being described by a certain rule to wheelwrights, which is not the case with any others, and is the reason that they seldom make two ploughs that go alike. The first is the semi-cycloid, see fig. 7, plate XVII. Let C E F D be a flat board, having a ledge D F fitted to the

bottom; apply the wheel  $AB$  on the board to the ledge, and having fixed a pin to the edge of the wheel at the point  $A$ , move the wheel from  $B$  towards  $F$ , till it is turned half round, and then  $A$  will be at  $a$ , and the pin will have described the semi-cycloid or proposed figure  $ADa$ ; which being turned upside-down will be the true form of my plough from the point of the share to the throat.

The other is the half of a semi-ellipsis, of which the semi-conjugate diameter is sixteen inches, and the distances of the focus's from the common center likewise sixteen inches; thus the figure is described by a right-angled triangle, whose base is 32 inches; but as some wheelwrights may not be acquainted with the mechanical method of describing this figure, I shall explain it in fig. 3, plate XVII. Upon the indefinite right line  $AB$ , raise a perpendicular  $CD$ , and from the point  $D$  mark off with the compasses sixteen inches at  $E$ ,  $C$ , and  $F$ , at which points stick in three pins and tye a string round them; then remove the pin at  $C$ , fix the point of the compasses into the string, and describe the figure  $CGH$  round the two centers  $EF$ : the one fourth part of the figure  $CGH$  turned upside-down is what is required. The lower part of this has as gentle an ascent as the other, and therefore enters the ground as easily, and by rising more suddenly above the share it forms a sharper breast, and by that means prevents any loose mould hanging in the throat, which undoubtedly is an advantage, especially when the ground is between wet and dry. But in lay ground, which is to be ploughed up for sowing, I should prefer the other, as it will not be so liable to break the furrow, which should be carefully avoided; otherwise the grass will be harrowed



harrowed up and become prejudicial to the crop. Thus, as different soils will certainly require a different form of the breast, I shall not pretend to recommend either of these for general use: what I propose, is to give the wheelwright a certain rule to work by, which will hold good with every variation that may be required, either on account of the soil, or fancy of the farmer. This last mechanical operation may be varied in any manner he pleases. For example, if the form of the breast, fig. 8, is too steep, by extending the two centers  $E F$  to 17 inches distance on the transverse diameter to  $I$  and  $K$ , letting the perpendicular  $C D$  remain 16 inches, which will be the pitch of the throat; the string fixed round the triangle  $I C K$ , as explained before, will describe the elliptical figure  $A C B$ , of which the fourth part  $A L C$  is the form required; and in this manner it may be varied by a certain rule, which not only facilitates work, but produces an instrument, which from its regular form cannot cause any obstruction in the free passage of the mould, which every plough I have yet seen does, in some part or other of the breast or mould-board.

These different sweeps regard only the land side of the plough: as to the form and sweep of the mould-board, I confess I have but very lately been able to determine it by any rule that can be laid down to a workman. My method has been, to attend to the falling of the earth when turned over by the breast, and to form the board to that curve, that it may easily slide over it without pressure; but, as I think I have now discovered a practical rule, by which a plan of any form may be laid down on paper, I shall hereafter explain it, with drawings of different

different sections of the mould-board, which I recommend for general use.

The bottom of the breast, where the buck of the share joins to the board, I make as broad as can be admitted of. This of course is very flat, which I think assists in raising the furrow, being continued in a gradual sweep to the heel of the board, which is not above half an inch wider than the fin of my share. I must here observe, that the bottom of my mould-board is an inch and an half from the bottom of the furrow; and as the upper part of the heel of the mould-board hangs over some inches, if the line of inclination was continued to the bottom of the furrow, it would not be wider than the fin of the share. In every other respect, my plough resembles the *Rotheram*, except indeed in the fin of the share, mine being much broader: the breadth of the fin of my plough, which is the size of the *Rotheram*, is full nine inches wide, and so in proportion to the size of the plough. This is contrary to the general practice; but I am convinced it is right, and speak from experience.

My reason for trying the broad share was, that as the cohesion of the earth creates a much greater resistance than its weight does to the plough, I thought it fit to cut the whole furrow I wished to raise; whereas the narrow fin cuts only a part, and leaves the remainder to be torn up by the wrest of the plough. Some ploughmen think this last circumstance necessary in lay-land, and say, if the share cuts the whole furrow, it will slip away and be set on edge; which is certainly the fact, when the mould-board and body of the plough is badly constructed; but when the proper sweep of the board is observed, and care taken that the heel

of the plough is not too wide, I assert that the furrow will be turned over as flat as it is by those ploughs that only cut a part of the furrow; which last circumstance is a confessed fault, as a part of every furrow, suppose a fifth over the whole field, is left undisturbed, and is still of greater consequence in lay ground, which has acquired a degree of cohesion in proportion to the time it has been laid down to grass. The objection of others, is, that in stiff land the broad fin will suck into the ground; or that the plough will ride upon the fin, and be thrown out of her work. I have proved the contrary to the conviction of my servants. But indeed I am very careful the fin does not hang down below the point of the share. My rule is, that the point of the share, point of the fin, and heel of the land-side, shall all touch a level surface when the plough stands upright; forming an arc from the point of the share to the heel at the bottom, and the same on the land-side. See Plate XVII. Fig. 5. I do this because the point and heel always wear the soonest, and consequently, without being hollowed, would soon become convex; after which the plough could not go steadily. For the same reason I am likewise careful to have the short side of the buck of the share clear the ground by an inch; for if that ever touches the ground, it immediately throws the plough out.

For the like reason I also make the land-side concave: and indeed by this form of the land-side and bottom, I can suppose the friction is somewhat diminished; for though friction will always be in proportion to the weight and velocity, whatever space the surface occupies, each part in contact bearing its share, and therefore as much when touching only in two points,

as when touching on the whole; yet I imagine this can only hold good when the plane, on which the body is moved, is smooth and hard; but in the case of a plough moving through a body of earth, the stickage or adhesion of the earth to the plough, will be in proportion to the nature of the soil, and condition it is in as to being wet or dry, and therefore the friction be more or less, in proportion to the number of points in contact. There is also this additional reason, that the point of the share ought to tend a little into the land, because the draught of the horses is applied obliquely; especially when all the horses go in the furrow: and even when they go abreast, I have always found it necessary. In the last case, the necessity of it appears to me to arise from the plough's not having so firm a resistance on the furrow side, which renders it liable to be thrown out of its work by the sudden jerk of a horse; and this would likewise be the case if the point of the share did not tend a little downward into the ground. In my opinion, the not observing this rule is a fault in all the *Rotheram* ploughs I have seen; and the ploughman is obliged to rectify it by setting the coulter very much into land: but I think it is best, that the coulter should only just clear the land-side of the share; and I know by experience, when ploughs are made well, that is the only position they will work in. But it is impossible to lay down one general rule for the setting a coulter, either as to the vertical or horizontal angle: that must be left to the ploughman. For example, if the point of the share is not well hardened, it will in one day's work wear out of land, or out of depth: in the first case, the coulter must be set into land to keep the plough in the straight direction, as the tendency into land must counteract

teract the oblique draft of the horses: if the point of the share has not depth enough, the coulter should be set backward and not too close to the share, that the share may have more freedom to enter the ground: if on the contrary, it has too much depth, the coulter should be set forward, sometimes even before the point of the share, and very low: in this instance the resistance of the earth against the coulter being before the point of the share, it prevents its pitching too deep: this should likewise be done when working in clay, for then the point will always suck into the ground; but when a plough is perfectly well made, and working in ground of moderate stiffness, the coulter should be a little above the point of the share, and just clear the land-side.

The swing-plough, when well constructed, is a very good instrument: but as it is liable to be thrown out of its work by a slip of the ploughman's foot, which throws the greatest part of his weight upon the handles; or by a jerk of the horses, which will elevate the point of the share; it is an awkward tool to introduce into countries where the men are not used to it. Therefore, where the land is dry enough to be worked flat, which will admit of the wheel-plough, I greatly prefer it; particularly when necessary to plough deep. And I am of opinion that the draught is at least as light, provided the proportion of the sizes are nearly equal.

I make the form of the body of the wheel-plough exactly the same as that of the swing-plough; the only difference I make, is, that I set the point of the share more down, because now the beam becomes the most essential lever, which having a much steadier support on the  
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frame of the wheels, than it could possibly have when hung to the traces of the horse; the additional tendency of the plough into the ground, caused by the dipping of the share, having the steady and uniform support of the beam on the carriage, enables it to overcome the various obstructions in the ground, without the risk of pitching in too deep, or of being thrown out of its work, which the swing plough is so liable to, when the different powers of the horses and men lose their equilibrium.

In this plough, the handles become a lever of the second kind, chiefly useful to lift the plough out of the ground at the ends of the lands; and in this instance the handle and beam become one compound lever, the fulcrum being where the beam rests on the carriage. If the point of the share be not set deep enough, so as to tend sufficiently into the ground, the bottom of the plough will not go on parallel to the bottom of the furrow, but will (as the farmer expresses it) run upon her nose. In this case the ploughman is obliged to throw his whole weight upon the handles, and yet this is often ineffectual; but when the point of the share has a sufficient tendency into the ground, the plough will go a considerable length without holding. Here it is to be observed, as in the foregoing instance, that the use of the handles in the wheel plough is directly contrary to what it is in the swing plough; for in the last you raise the handles to give the point of the share more tendency into the ground, and press upon them to prize the share out of the ground, which shews the necessity of giving more depth to the point of the share of the wheel-plough; for, as in the swing-plough, by raising the handles, the inclination of the share

will have a greater tendency into the ground, and that in the wheel-plough, as the beam is supported by the carriage, the point of the share is kept uniformly to the pitch it is set at, it is evident that care must be taken to give it sufficient depth; if too much depth is given, that is to be remedied by raising the beam, as will be fully explained in its proper place. This evidently points out the utility of the carriage; and the steady going may be accounted for, Plate XVII. Fig. 9. by the tendency of the plough into the ground in the direction A C, being balanced by the resistance of the carriage against the beam (which is in the direction A B) to that tendency; and these being equal, and in different directions, it is plain that the progressive motion of the plough must be in the direction A D. But to explain this established fact by a familiar, though trifling instance, I shall compare it to the childrens play of shooting cherry stones, by pressing them between their finger and thumb; when those pressures are equal, being in different directions, they will shoot them very straight, otherwise they fly off obliquely: this must be the same with the plough; for though the progressive motion of the plough is occasioned by the draft of the horses, yet the resistance of the earth on the share, and that of the frame against the beam being in different directions and equal, the progressive motion must be in a straight line between those two powers of resistance.

Many people object to the wheel-plough, as being heavier than the swing-plough: but when we consider, that notwithstanding the additional weight of the carriage, for which you must likewise add a little more than a third part for friction, in such a rough machine as this, the

the whole being carried on wheels, the friction will be lessened in the ratio of the square of the diameter of the wheel, to the diameter of the axle. The weight of the earth upon the plough being in a great measure supported by the carriage, reason plainly tells us, that the wheel-plough will be more easily drawn than the swing-plough, and experience has confirmed that it will. There appears also to be an additional advantage to the horse, which is, that the line of direction of the draught is not from his shoulders to the point of the share, but through (or rather even with) the center of the wheel; which of course is not in so oblique a direction, and consequently the advantage to the horse will be in proportion to the length of the lever, or radius of the wheel. I do not mean, that the power of the lever has any influence or advantage in drawing the body of the plough; for that cannot be, because neither B nor F in fig. 10, plate XVII. have any greater progressive velocity than the plough itself has; but only that its length is an advantage to the horse, by making him draw more parallel to the ground line, and makes a big wheel easier to draw than a small one; that the friction in the wheel will be in proportion to the radius, and that the great wheel will surmount obstacles with more ease than the little one.

The carriage of the *Norfolk* plough seems preferable to all others, on account of its high wheels, the advantage of which I shall endeavour to explain by fig. 10, plate XVII.

Let A be the point where the power is applied, that draws the wheel HC along the plane DCG, and B the center of the wheel; then DBA is the line of traction, which makes the angle of traction ADG. Now if we consider BC as a lever, whose fulcrum, or centre of motion



motion, is at C, the line of traction being obliquely applied to this lever at B, the drawing power will be of no greater advantage, than if the line of traction were applied at E to the shorter lever E C, to which it is perpendicular; but if the size of the wheel be increased from H C to that of I C, and the power continues to act or pull at A, then F will be the center of the wheel, and F A the line of traction, which being perpendicular to the lever F C, the power will act with the greatest force or advantage on that lever, for drawing the wheel along the plane D C G, both on account of the greater length of lever, and pulling at right angles to it. And thus the effective power of the horse will be as much greater on the wheel I C, than on the wheel H C, as the radius F C is longer than E C. So that the higher the wheels are, the more easily they will be drawn, provided their axes are equal, and below the level of the horse's shoulder, when sunk down by exerting himself at the pull.

Though this established fact may be sufficiently explained and understood by many, yet by others it may be deemed a mere *ipse dixit*. And as the construction of all wheel carriages and rollers depends on the following proposition, which, to the best of my recollection, has never been taken notice of in any book that treats on instruments of husbandry, I hope it will not appear improper, if I insert it here, with an attempt to demonstrate it by a very familiar experiment on the steelyards.

First, I say, in a wheel moved along any plane, a lever is to be found, whose fulcrum or center of motion is that point in the periphery of the wheel, which is in immediate contact

with the plane; and if the line of direction of the draught to the other end of the lever, which is the center of the wheel, is not horizontal with the plane, it will form an angle of traction, as in the present case,  $ADG$ , and the power applied in the line  $DBA$ , to the long lever  $CB$ , to which it is oblique, will be required to be as great as if it was applied to the short lever  $EC$ , to which it is perpendicular; in like manner, if the power was applied in the horizontal line  $BK$ , the power required would be as much less, than if applied in the oblique direction  $DBA$ , as  $EC$  is shorter than  $CB$ ; for in this case the power drawing at right angles, will be to the power drawing obliquely, as the sine comp. of the angle of traction is to the radius; and  $EC$  being perpendicular to  $BD$ , the hypotenuse of the right angled triangle  $DCB$ , the triangle  $BCE$  must be similar to  $BDC$ , which is similar to  $ADG$ , because  $BC$  is parallel to  $AG$ .

This I shall attempt to demonstrate by the steelyard, that is, why the acting distance of a power must be at right angles with the end of the lever, and that whatever length the lever is of, if the power is applied in an oblique line, it will only act as a tangent to a circle, of which the radius is at right angles with such line; but as in the steelyards made for the use of families, the center of motion is below the points of suspension, and consequently will not remain long enough in equilibrio to shew the experiment, I made one to explain this fact to my wheeler, which has the center of motion immediately above the line, in which the points of suspension are. If the three points were exactly in a line, equally proportionable weights would suspend each other in any position of the beam.

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mention these circumstances as a hint to any one, who may chuse to try the experiment.

Fig. 11, plate XVII. is the steelyard I constructed, having the beam  $AB$  20 inches long, with the center of motion  $C$ , 4 inches from the point  $A$ , and 16 inches from  $B$ . At the point  $A$  suspend a weight  $W$  of 4 ounces, and at the point  $B$ , on the long arm  $CB$ , being four times as long as  $CA$ , hang the weight  $P$ , of one ounce, which will counterpoise the weight  $W$ , the beam will be horizontal, and the weight hang perpendicular to the beam. If you extend the beam four inches longer to  $D$ , and hang the weight  $P$  at  $D$ , it will overbalance the weight  $W$ ; but if to the center  $C$  you fix the oblique arm  $CE$ , equal to  $CD$ , with the point  $E$  perpendicular to  $B$ , and hang the weight  $P$  at  $E$ ; it will hang obliquely to the long arm  $CE$ , and have no more effect on the weight  $W$ , than if it hung on at  $B$ , the end of the short lever  $CB$ ; to which it will hang perpendicular. In like manner, if you hang the weight  $P$  at  $D$ , and bring the string over a pin at  $E$ , it will hang obliquely to both the long arms  $CD$  and  $CE$ , and have no more effect on the weight  $W$ , than if it hung on at  $B$ , to which it is perpendicular. Further, if you hang the weight  $P$  at  $B$ , and place the string over the pully  $F$ , the weight  $P$ , which suspended  $W$  in equilibrio, when hanging perpendicular at  $B$ , will now, in the first instance, be no more effectual, than if pulling at  $G$  the end of the short lever  $CG$ , to which the line  $FBG$  is perpendicular, which will be as if the weight  $P$  was hung on the horizontal beam at  $H$ , as proved by the above proposition: but the weight  $P$  hanging at  $H$ , not being sufficient to suspend the weight  $W$ , the beam  $ACB$  will become a  $Cb$ , to which the

line of direction of the power  $Fb$  will be perpendicular. In this case, the exact proportions of the weight will be preserved, the weight  $W$  will hang obliquely to  $Ca$ , perpendicular to  $K$ , as  $P$  will hang obliquely to  $Cb$ , perpendicular to  $I$ , when  $CK$  will be to  $CI$ , as  $CA$  is to  $CB$ . It is evident, to try this experiment, that the short arm  $AC$  must be made to counterpoise the rest of the steelyard, when no weights are hung to either.

This experiment plainly shews, that in fig. 10, plate XVII. the power applied to the center of the wheel  $H$ , in the direction  $BK$ , will be as much more effectual, than when applied in the oblique direction  $AB$ , as  $EO$  is shorter than  $BG$ , and therefore the power applied in the oblique direction  $ABD$ , to  $BC$  at the point  $B$ , of no more effect than if applied to the short lever  $EC$ , at the point  $E$ , to which it is perpendicular; consequently, as the power is by supposition at  $A$ , and the line of traction  $AF$  is parallel to the plane  $DCG$ , and at right angles with  $EC$ , perpendicular to the plane, it is the most advantageous line of direction of the power, both on account of the application of the power, and that the friction of the weight of the wheel and carriage will be diminished, in proportion as the diameter of the wheel is to the diameter of the axis, with this additional advantage in favour of the great wheel, that it will go over clods and stones, with much more ease than the small wheel, and not sink into cavities, which would bury the small wheel. However, what has been proved above, is only strictly applicable to weights over pulleys; for, as the power of the horse does not solely consist in his weight, but in the exertion of his muscles, it is necessary, that the line of traction should

incline a little from his shoulder to the ground, that he may have a firmer resistance of the ground, to enable him to exert his muscular strength.

This long digression from the description of the plough, which only was at first intended, may be criticised; but as a doctrine in favour of low wheels has lately found its way into the world, and as, in consequence of it, I have heard myself condemned by some for the height of my wheels, and have been applied to by others for my opinion on the subject, I thought it might not be improper to introduce it in this place, for the consideration of my brother farmers: indeed, the only apology I can make is, that I never found that this subject was ever touched on, even in the slightest manner, in any book that is likely to fall into their hands; otherwise it must betray more than stupidity, to offer to advance an explanation of a fact, that stands self-evident in the mind of every one the least conversant in mechanics.

The beam of the wheel-plough seems to be as little understood as that of the swing-plough. The reason of its being raised so high in the *Norfolk* plough, may be accounted for by the height of the wheels: but as I have seen the same pitch of the beam applied to low wheels, I shall endeavour to point out wherein I think this last method erroneous. First, I lay down as fact, that the end of the beam, which rests on the bolster of the carriage, must be affected by the wheels, when they are put out of their perpendicular position by clods of earth.

Now, as the center of motion of the carriage is in a perpendicular from the end of the beam, between the wheels: the higher the end of the beam is above the wheels, the larger the arc will be, which the end of the beam describes by

the wheels being put out of their perpendicular position; and consequently the body of the plough will be proportionably affected; that is, the arc, described by the point of the share on the horizontal plane, will be to the arc described by the end of the beam, as the length of the bottom of the plough from point to heel, is to the length from the end of the beam to the heel, which is the common fulcrum. As to the alteration on the vertical plane, it must be equal, whether the beam is pitched high or low, only that the ascent and descent of the point of the share will be more gradual with high wheels, than low wheels. Some think, that by pitching the beam so high, the plough will go closer at heel; but the carriage acting, as a fixed perpendicular prop, will support the beam equally steady at any height; and if you describe a vertical arc, by the end of the beam, the nearer it comes to a horizontal position, the further that part, which rested on the bolster, will go beyond the perpendicular from the point whereon it rested; consequently, if the frame be carried forward to that point of the beam, the power will be applied nearer at right angles at that point in the lever, and in such proportion a less degree of power will be sufficient to counteract the resistance; or in other words, a less weight will be on the wheels. And therefore if the first application of the carriage was sufficient, a shorter beam will do, when pitched nearer to a horizontal position, with the additional advantage of the plough being stronger, as the frame work is more compact. To elucidate this more fully, I shall endeavour to explain it by fig. 12, plate XVII. A B is the high pitched beam, C the center of the wheel, whose perpendicular frame supports the beam at B; but as the beam or lever A B is oblique to  
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the prop C B, it acts with no greater power in supporting the weight, than the shorter beam A F, which is nearer at right angles with C F; but if the beam A D is described equal to A B and E, the center of the wheel of the carriage, which supports the beam at D, the prop E D will be nearer at right angles with the beam A D, which is equal to A B, and in that proportion the greater advantage of the lever is obtained. Thus it is evident, that in the beam A D the pressure is less on the center E, than it would be in the beam A B on the center C; consequently, if the weight is not too great at C, a shorter beam is sufficient in the direction A F.

I have endeavoured to ascertain the angle which the beam ought to make with the horizontal plane, as likewise the angle which the point of the share ought to make with the same plane; but as the diversity of soil, and the different condition the same soil will be in from wetness renders it impossible to fix certain data, I found it impracticable; the only observation I have been able to make is, that when the end of the beam, that rests on the bolster, has been within ten inches of the axle of the wheels, if the point of the share tended sufficiently into the ground, the plough has gone as close at heel, as when the beam was mounted higher, and infinitely steadier, for the reasons before mentioned; therefore this must be determined by the height of the wheels, and by the different depths you wish to plough; if shallow, reason points out, that the beam need not be pitched so high; but if deep, allowance must be made for lowering the beam on the carriage. The beam of my plough, which I frequently work 18 inches deep, makes an angle of 18 degrees with the horizon: as to the dipping of the share, I

fear that must depend on the nature of the soil and judgement of the ploughman. If the plough does not go close at heel, and that this imperfection in the going of the plough is not occasioned by the width of the heel of the mould-board, which in that case will ride on the furrow, especially in strong land, you may depend on it, that the point of the share is not set deep enough. Very little alteration will sometimes produce the desired effect; therefore it should be done with caution; for if set too low, the beam must be raised on the bolster of the carriage till the diagonal of the parallelogram completed from the tendency of the share, and position of the beam, becomes parallel to the horizon.

The only part of the wheel-plough, which now remains to be considered, is the chain, which fastens the plough to the carriage. In regard to the position of it, different countries have their different practice; they all indeed agree in this, that the end, which is made fast to the carriage, should be hooked on a little below the axle of the wheel; but the application of the other end of the chain, differs according to the custom of the country; in some places they fix it round the near handle, immediately above or below the heel of the beam; others fix it over the beam, behind the head of the sheath; and in some parts of *France* they use no chain, only have a wooden collar, which goes over the fore end of the beam, where it is confined by a wooden pin, which goes through the beam, and under the end of a piece of wood, which goes through the axle-tree of the wheels, to which it is likewise confined by a wooden pin. Now these three methods are as opposite as possible; yet when the plough is well constructed, I never could discover any difference arising from the different applica-  
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tion of the draught ; the first indeed evidently seems best calculated for the strength of the plough, as the chain goes round the whole body of it ; but in this case, the chains are generally lashed up to the beam before the coulter. There are two reasons for this ; the one is, that in ploughing deep, the chain hanging so low, would prevent the mould from rising ; the other is that, if the heel of the beam is pitched low, the chain will incline upwards to the carriage ; whereas, I believe, it is proper that the chain should have this different direction, as it will draw the plough into the ground, which tendency, as I have explained before, will always have sufficient and steady resistance in the carriage, against the beam. The *French* method is certainly bad, nor could it produce the desired effect, was it not that their beam is excessive stout, not admitting of any elasticity. Cheapness is undoubtedly their motive ; but it could not possibly answer in strong work : for my own part, I prefer the placing the chain over the beam behind the sheath : but I use this precaution in my large ploughs ; I have a long link which goes from the end of the chain on the beam round the heel of the plough, immediately below the heel of the beam ; this confines the whole body of the plough together, though the draught in fact is from the top of the beam.

As what I have said above is in part to prove, that the position of the beam cannot affect the plough, in regard to its going close at heel, I shall just mention what I have proved to many, which is, that unless a plough is narrow behind, it cannot go close at heel, but will ride on the furrow ; and that unless the point of the share has a sufficient tendency into the ground, the plough cannot go level at bottom.

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I have already declared (what I believe will be allowed) that different soils and different operations, require different ploughs: but as there are many farmers who cannot afford to have variety of ploughs, I shall venture to recommend one for general use, which seems to answer the several purposes much better than any I have yet constructed. The constituent parts are put together in the manner of the *Rötheram* plough. See plate XVIII. fig. 2. The shape of the breast, from the point of the share to the throat, is the arc of half a semi-ellipsis, whose semi-conjugate diameter is 16 inches, and the focus's at 17 inches distance from the common center. See plate XVII. Fig. 8. the outward sweep of which, A L C, is the above-mentioned form. As to the form of the mould-board, I shall not dogmatically pronounce it the best that is; but as it is the best I have yet made, I shall venture to give the description of it, observing, that as I made it by the eye, and completed it in the field by attending to the ascent and delivery of the furrow, I took the dimensions of all the different curves, and laid them down on paper. I shall describe the method by which I did it, not without hopes of its leading to a discovery of some easy practical rule for the use of workmen, who have at present no other guide but their eye, to form the sweep of a curved board, which is tedious, and consequently very expensive; and therefore I suppose the reason that the straight board is so much in use, having no other recommendation than cheapness.

Plate XVIII. represents the frame work, and dimensions of the different parts of the plough without the mould-board. A B is the beam, 6 feet long, having the under part of the two ends 14 inches from the ground line: C is the sheath,

7 inches

7 inches wide, where it is mortised into the beam; it is 3 inches thick, and bevilled off in the breast, from the land side, to answer the curve of the mould-board: the front of the sheath at C is 18 inches from A, and 16 inches perpendicular from the ground line. D is the near handle, into which the end of the beam is mortised at A; it shuts close at bottom to the hind part of the sheath, and is fastened to it by the wooden pin E, and spikes at the bottom. F is a triangular piece of wood which shuts on the lower part of the handle D, and is fastened to it by the pin G, and spikes at bottom; this triangular piece makes the heel of the plough. H is the share, 18 inches long, from the point to the top of the buck P, having the fin Q 14 inches long, and 9 inches wide. This width is right in free land; but in stony land it will require a point at the end, nor must the fin be wide: indeed some lands are so stony as not to admit of any fin: it goes on upon the end of the sheath, as in common ploughs it does on the ship; the land-side is continued the whole length, and drops at the heel about  $\frac{3}{4}$  of an inch below the triangular piece; this forms the arc at bottom, from the point of the share to the heel: it is fastened on by a screw-bolt, which goes through the triangular piece at I. The heel of the plough rests solely on the heel of the iron plate, without suffering the wood to touch the ground; which, for the reason given in page 540, must diminish the friction; but this indeed is more effectually accomplished by Mr. Moore's very ingenious thought, of placing the vertical wheel in the body of the plough, which serves as the heel of the plough: but in striking up the last furrow of the land, I have experienced the advantage of the iron heel, as by its cutting into the ground it prevents the plough slipping away from her work. K is the coulter, fixed in the

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the beam with wedges 8 inches before the sheath. L is the off handle, to which the hind part of the mould-board is fastened by the large wooden pin M, which goes through the mould-board, handle, and triangular piece at the heel: the ends of both handles stand level when the plough is upright, to render it difficult for the ploughmen to hold the plough over on the land-side. The ends at N are 2 feet 9 inches from the ground, and 4 feet 2 inches from the end of the beam at A: the perpendicular from A is 6 inches behind the heel of the plough: from the heel to the point is 3 feet: from the point of the share to the bottom of the end of the beam at B, is 2 feet 9 inches. O is the *Suffolk* cope with the cat-head, as described in plate XVII. fig. 1 and 2. R and S are two wooden pins which fasten the breast of the mould-board to the sheath. T U two wooden pins that fasten the tenon of the sheath into the beam. The framing of this plough, which is the same as the *Robertson*, appears much stronger than the common one, and admirably well contrived to prize the weight of earth on the share, without a possibility of racking the tenons of the sheath and beam; for you will observe that the handle which rests on the triangular piece at the heel, prizes up the lower end of the sheath on which the weight of earth is; forcing it up to the beam, and thus, by lifting the beam, prevents the tenon, which is mortised into the handle, from being strained; whereas, in the common plough they are always pulling aiunder, requiring a false coulter and tuck to keep the beam and chip together; and as this plough requires none, it shews how much stronger the construction is.

Plate XIX, represents the compleat body of the plough; the horizontal lines on the mould-board, marked *aaaaa*, are square, with parallel lines

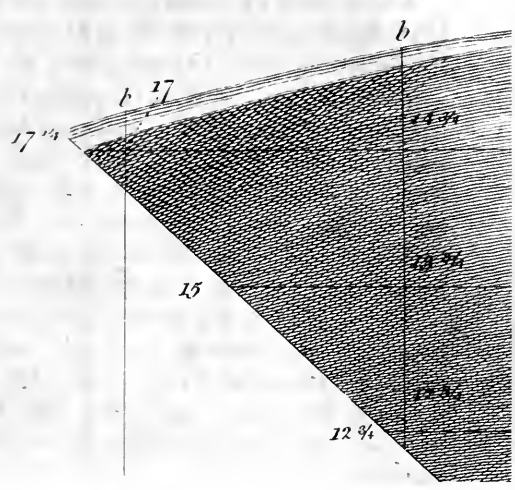
lines on the land side of the plough, which are all 3 inches asunder, except the under one, which is only  $1\frac{1}{2}$  inch, from the second being  $1\frac{1}{2}$  inch clear of the bottom of the furrow: as, in this, I differ with many, shall give my reason, which is, that when the plough is working in land that cuts up whole furrow; if the bottom of the board, or ground-wrest, touches the furrow that is turned over, it must press it in at bottom, which will naturally make it fall back again at top, or at least set it on edge; and, if in loose mould, by squeezing in the bottom, the upper mould must fall back into the furrow, having no base to support it: my rule is, that the heel of the board shall just slide against the furrow, without displacing it from the form it fell in.

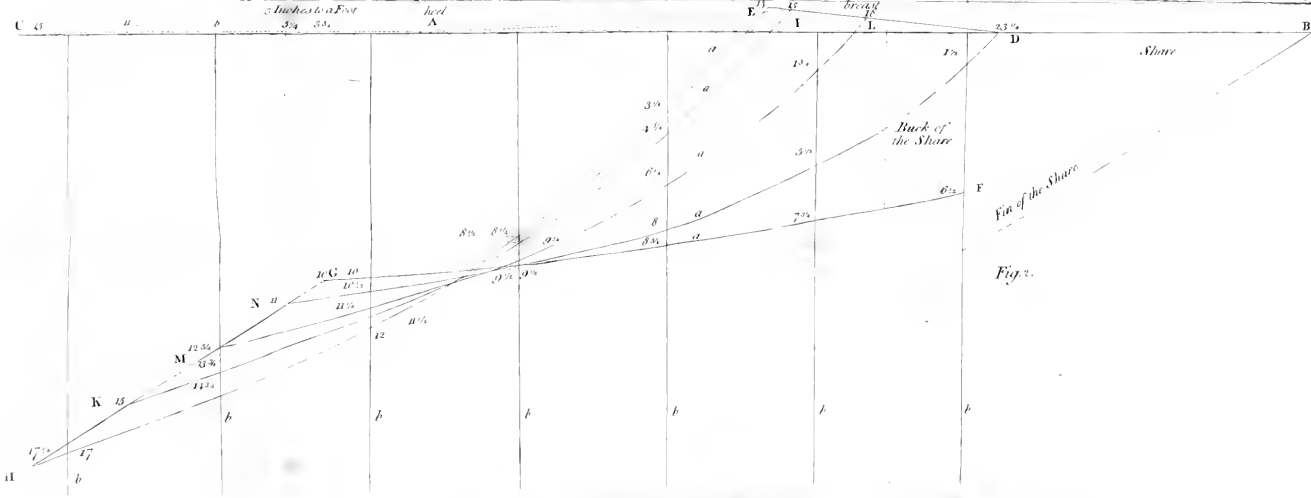
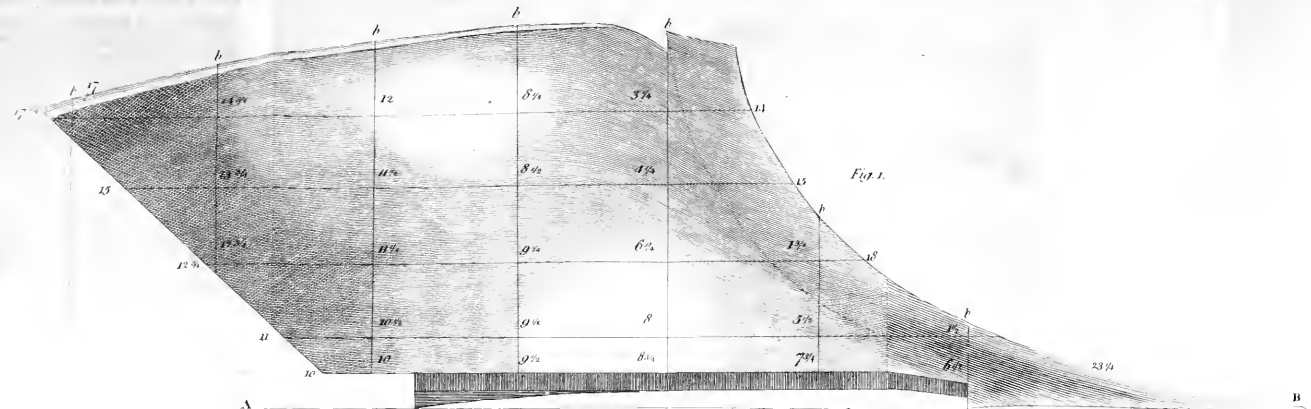
The perpendicular lines *bbbbbbb* are square, with parallel lines on the land-side, which are 6 inches asunder where the lines intersect; I took the dimensions of the thickness with callipers, as marked on the boards which correspond with the marks in Plate XIX. fig. 2. which represents the perpendicular, or bird's-eye view of the mould-board: the curved lines *aaaaa* in this figure, correspond with the horizontal lines; and the perpendicular lines *bbbbbbb* with the perpendiculars: where these lines intersect, the figures shew the distance from the line *A B*, which is supposed to be the land-side of the plough: these correspond with the dimensions taken by the callipers, as marked on the upright board; they are both drawn to one scale, of 3 inches to the foot. As it is necessary that the breast of the plough should hang over a little to the land-side, I was obliged to raise a perpendicular board, square with a line drawn from the point to the heel: by this means I was enabled to fix the callipers, taking off the difference of the thickness

thickness of the board from each measurement.

I have been the more prolix in the description of these figures, being unwilling to omit any circumstance which might explain them, as, at least, it is a certain and easy method for a wheelwright to take the exact dimensions of any plough he is ordered to copy, and by making moulds from the curved lines in Plate XIX. fig. 2. and applying them (according to the following directions) to the mould-board, when hewed out to near the shape; he will easily bring it to the required form.

Let  $AB$  be a line drawn from the heel of the plough to the point of the share; extend the line from  $A$ , 15 inches to  $C$ : and at  $D$ ,  $23\frac{1}{4}$  inches distance from  $A$ , raise the line  $DE$ , which represents the hanging over of the breast of the mould-board on the land-side; making an angle of about 83 degrees with the plane of the horizon. Then place the mould of the lowermost curved line, to the angle of the buck and fin of the share at  $F$ ; which is  $6\frac{1}{2}$  inches distance from the vertical plane of the line  $AB$ ; and 10 inches distance from the same plane at  $G$ ; extending  $3\frac{3}{4}$  inches beyond the upright square of the heel  $A$ . The end of the mould at  $G$ , must be  $1\frac{1}{2}$  inch from the ground; but at  $F$  it will be but about an inch and a quarter; rising gradually to the end of the buck, as represented in Plate XIX. You must then apply the uppermost mould at  $E$ , which is 12 inches perpendicular from the ground, and 14 inches from the perpendicular of the heel  $A$ . The mould-board must then be worked with the spoke shave, till the other end of the mould, when held quite horizontal, will touch at  $H$ ; which is likewise, of course, 12 inches from the ground; and  $17\frac{1}{4}$  inches from  $C$ , on the vertical plane of  $CAB$ , extending 15 inches beyond the square of the heel  $A$ . These two curves being fitted, cut off  
the







the heel of the mould-board in the line G H. You then proceed to fit the moulds I K, L M, and D N, dropping each curve 3 inches perpendicular; when the curve D N will be 3 inches from the ground, but only  $1\frac{1}{2}$  inch from F G: This was done to take the most curves, where the greatest twist of the board is required.

With the above description and drawing, my wheelwright has made exact copies of this plough, without having the original plough to work by. I therefore flatter myself it will be sufficiently explanatory for the use of workmen.—My mould-board, indeed, rises about two inches higher; but as these were the only curves requisite for turning the furrow, I thought it needless to insert more lines, which the workman may do at his pleasure; having the sweep of the breast E D, and the heel of the board G H, for his direction. There is likewise this farther advantage, that by varying the sweep of the curved lines in Plate XIX. fig. 2. a workman may lay down any shape he thinks proper, and be certain his work will answer the drawing. As I mentioned that this plough performed the work much better than any I had made, I must remark one particular circumstance; which is, that all the curved lines nearly intersect each other in the center of the board. This was merely accidental, having formed the board entirely by eye; but may serve as a hint, and probably will prove, that their meeting exactly in the center, is the proper form for turning the furrow. I have reason to believe this was so; having worked the board some time without plates, till I found it to my mind: probably it may have been worked a day or two too long, and by that means be hollowed out a little too much in the middle of the board.

I shall conclude, by observing that a plough may be made of any dimensions, by the drawing

of Plate XIX. fig. 2. If it is required to be smaller, *viz.* of 2 feet 6 inches at the bottom, and the rest in proportion; the only alteration necessary to be observed is, to consider the scale as of  $3\frac{3}{5}$  of an inch to the foot, instead of 3 inches: if, on the contrary, it is required to be larger, *viz.* 4 feet long, and the whole in that proportion, the scale must be then considered as being of  $2\frac{1}{4}$  inches to the foot, instead of 3 inches.

*Ravensbury,*  
Oct. 2, 1770.

On this very sensible and truly practical essay on the construction of a plough, I shall only observe, that its utility must be apparent to the most superficial observer. Of what consequence is it to form one perfect plough, if you have no rules by which to execute another?

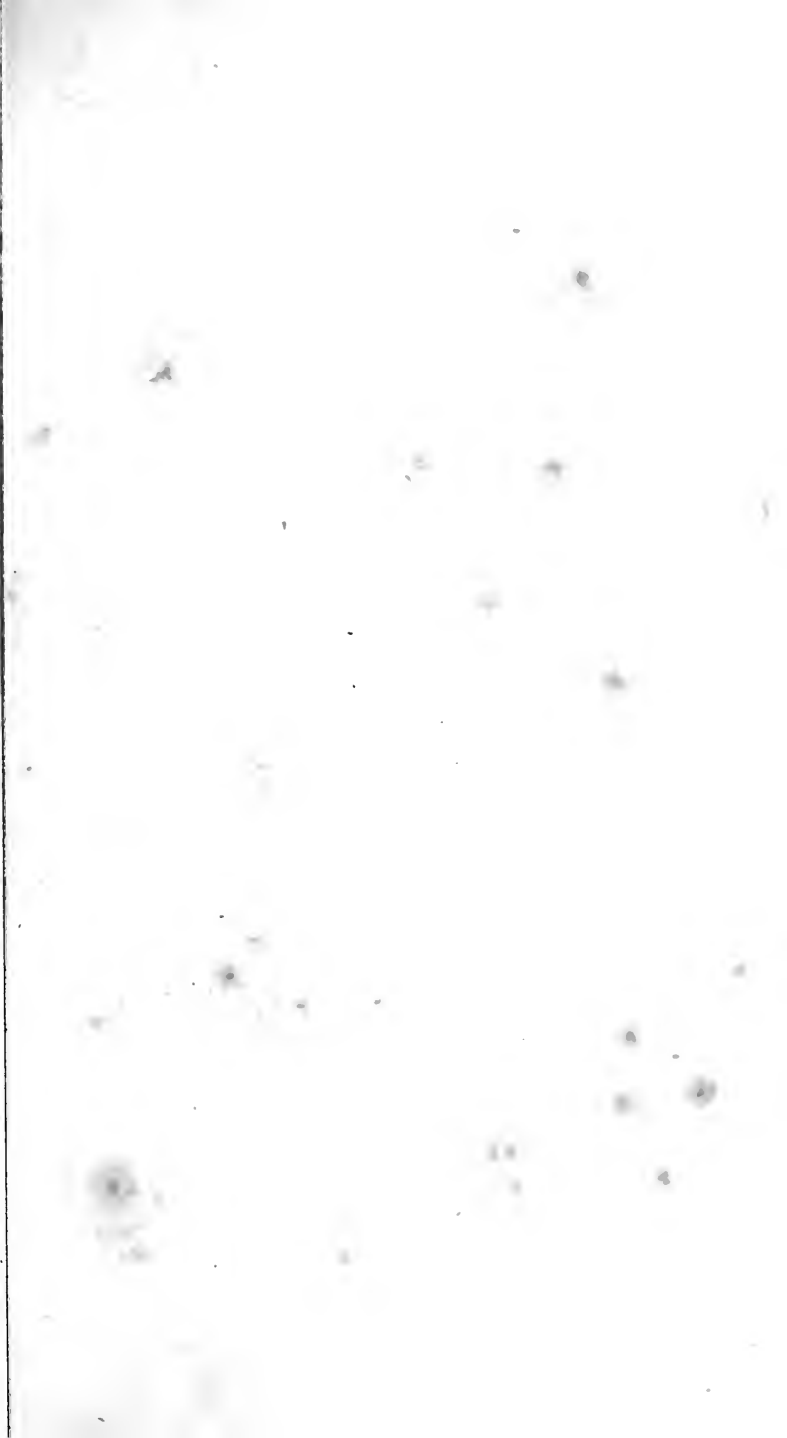
The following are the particulars of this gentleman's farm.

297 Acres in all	12 Labourers
126 Grass	3 Boys
171 Arable	37 Acres wheat
£.200 Rent	18 Oats
13 Horses	17 Beans
6 Cows	80 Madder
300 Sheep	10 Turnips
4 Young cattle	5 Cabbages
40 Swine	13 Fallow.
1 Man	

END of the SECOND VOLUME.









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