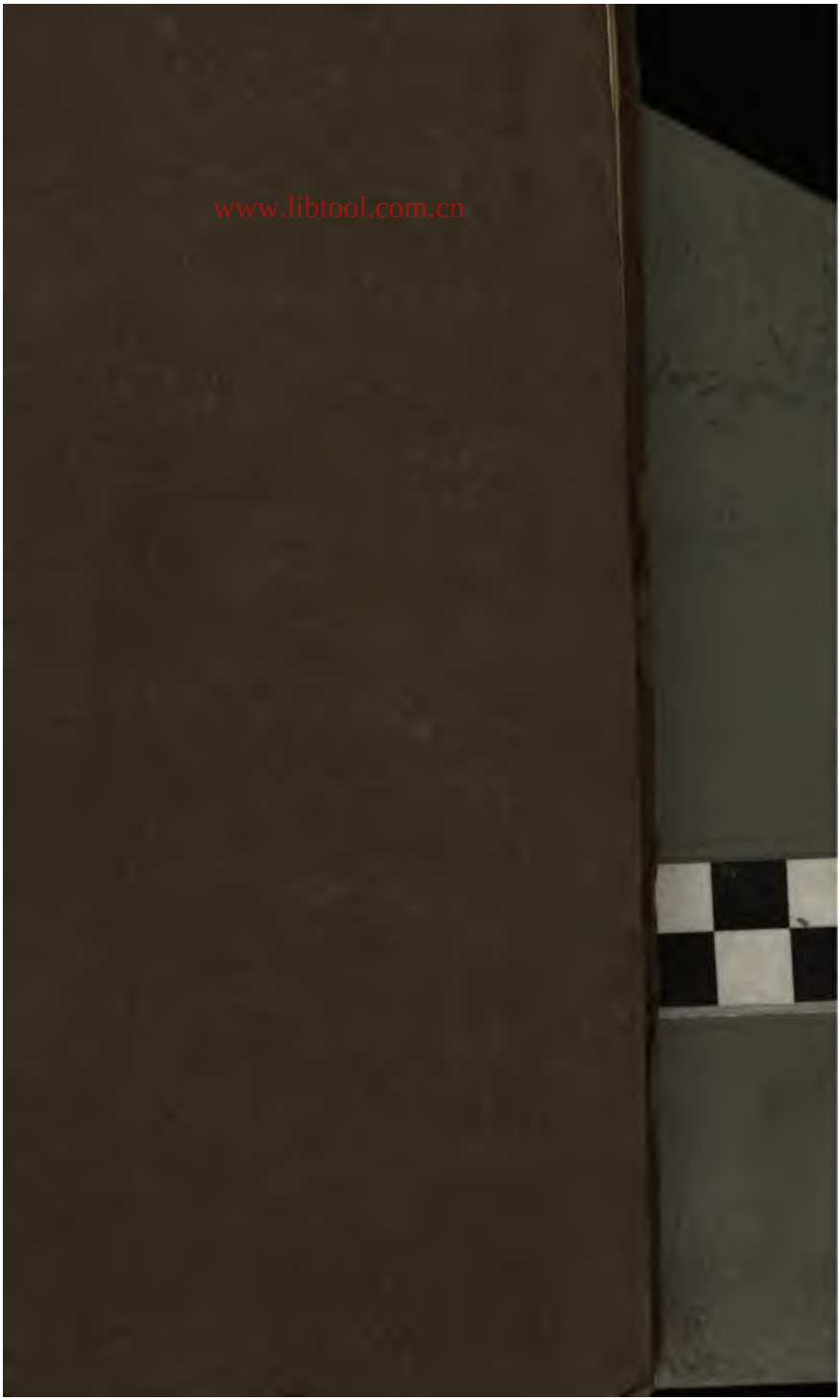

THE YOUNG FARMER'S MANUAL:

SHOWING THE

PRACTICE AND PRINCIPLES OF AGRICULTURE

AS

APPLICABLE TO TURNIP-LAND FARMS,

IN

THE SOUTH OF ENGLAND;

WITH

COLLATERAL OBSERVATIONS AND REMARKS ON AGRICULTURAL CATTLE, PLANTS, IMPLEMENTS, &c. &c.

BY J. MAIN, A.L.S.

LONDON:
RIDGWAY, PICCADILLY.
1839.

LONDON:
Printed by W. Blatch, Grove Place, Brompton.

PREFACE.

THE following pages contain a detail of the actual proceedings and practice of a working farmer, who took an active and laborious part in every operation which he describes: and although his practice be only directly applicable to a turnip-land farm in one of the southern counties of England, the general descriptions and collateral observations are calculated to be useful to every young farmer, wherever he may be situated in any part of the united kingdoms.

As the information was originally written in the form of a letter of instruction for a young friend who was about to enter into the business,

the descriptions are necessarily circumstantial. Even those matters which every boy about a farm may be supposed to be acquainted with, are minutely described; and this the writer has endeavoured to do in the plainest language. On all practical subjects it is scarcely possible to be too prolix: and though it may be a fault in the composition, it cannot be objected to by pupils or inexperienced readers, more especially as reasons are given for almost everything alluded to, or recommended to be done.

Agricultural writings already before the public, are either small practical tracts, or voluminous codes. The first are too concise: being confined to certain particulars, and the last are by far too bulky and diffuse for practical readers who only wish to know *when* and *how* any operation should be performed.

To such persons a general view of British farming, together with the ordinary practice and principles ou which it is conducted, is all that is required or thought necessary. A compendium,

therefore, which the author presumes this little volume to be, may be as useful as books of greater size and much greater merit.

To meet the wishes of those, therefore, who prefer an epitome to a more laboured performance—practical directions to scientific disquisitions—the following pages have been penned. and the writer flatters himself that, though the volume contains neither new nor valuable discoveries, it embraces everything belonging to *main-chance farming;* and moreover all necessary collateral information which will enable a farmer to prosecute a regular system successfully: or depart from it with safety, whenever local or incidental circumstances render necessary a departure from the regular course.

CORRECTION: Part of a sentence omitted, see page 192, seventh line from the bottom, after the words "There is no remedy for this;" add—unless doing for himself and labourers, that which is done for him and them, by the middle men alluded to.

CONTENTS.

THE

YOUNG FARMER'S MANUAL.

I took possession of Briery-Hill Farm on the twenty-ninth of September 1830. It is an old homestead, and the farm has been enclosed for above a century. It consists of about one hundred and thirty-two statute acres, including hedges, ditches, roads, and footpaths, together with two small patches of grass land, lying in a common mead by the side of a brook above a mile from the homestead.

The farm is bounded on one side by a turnpike road leading to a market town five miles off; and on another by a highway, leading into the interior of the country: on the other two sides by neighbouring farms.

The surface of the farm is undulating: some of the fields sloping to the eastward, and others the contrary; the eastern slopes being much better and deeper soil than the western. The fields are divided by hawthorn hedges and ditches, and contain from eight to ten acres each. Three of the larger fields abutting on the homestead, are old pasture; an enclosure of two acres of orchard being taken out of one of them.

The general staple of the fields is a free gravelly loam, and what may be called turnip land: some of the higher knolls are clayey and rather wet; but two or three of the fields at the lowest side of the farm are a heavy loam, and what is usually called good bean land.

The house is old fashioned, but convenient enough. It occupies nearly one side of a rectangular farm-yard, fenced off therefrom by a low paling. It contains on the ground floor, a parlour, two kitchens, and a large roomy hall, where brewing, baking, &c., are performed. There is a cellar under the parlour, and bedrooms and garrets over the whole. Behind is

a small dairy and pantry, &c. The outbuildings enclosing the yard, are three barns, straw-house, stable, cowhouse, open sheds, and cart-lodge. There is also a sheep-house, and several useful hovels about the premises.

On taking possession, my first business was to arrange my establishment of servants, consisting of a ploughman and boy, who sleep in the house, a shepherd, an odd boy, out, and a maid servant, and live and dead stock previously provided. My next affair was to examine the state of the farm, and to proceed with the most necessary labours. I took to hay, straw, and a nine-acre field of pretty good turnips, of which three acres were Swedes. Two acres of winter tares, with a sprinkling of rye upon the two first lands, had been sown, and had risen well. No wheat had been sown; but there were ten acres of clover-ley, and nine acres of bean-stubble ready for that purpose. The latter was ploughed first, and sowed with yellow Lammas wheat, a very fine variety, and which can be had as pure in the markets, as any other sort.

The choice of seed-wheat is a very material

affair with the young farmer. Among the very great number of cultivated varieties, amounting to several hundreds, some are much more prolific than others; yielding a double quantity to that of others, merely from the form or length of the ears. And there is also as much difference in the qualities of the flour as received from the mill. In the long course of ages since wheat has been in cultivation, there has always been one or two accounted superior to the rest. These favourite sorts have generally been named from the colour or form of the grain—from the place where originated, or from the name of the first discoverer. Hence we have Rivet and red Lammas; yellow Lammas and golden Swan; Devonshire white and Talavera, &c. &c. The two former are usually chosen for strong clayey soils; the others for lighter and more friable lands. These different descriptions, however, can rarely be met with pure: they are invariably mixed, more or less, with other sorts; and though this may not deteriorate bread baked from the flour of mixed wheat, yet the sample, being unequal, always sells for less money, especially if required for seed.

So far, however, are some farmers from being averse to mixed seed, that they sometimes mix it intentionally, thinking thereby to reap a larger crop. In this expectation, they are probably not mistaken; but if they gain in quantity, both of straw and grain, they certainly lose in value; because mixed wheat suits neither the generality of sowers, nor any of the millers, unless at a reduced price. Though it must be admitted that the high mixed samples of Dantzic wheat appearing in Mark Lane, command higher prices than any other sample in the market, yet this is chiefly owing to their great weight and dryness.

It is quite certain, however, that among our mixed varieties, some are far superior to others; and it ought to be a special object with every farmer to obtain such varieties for cultivation. Colonel le Couteur, of Jersey, has made the culture of the best varieties of wheat his particular study for several years, and has arrived at the following conclusion by actual and careful experiment; viz. "that one ear of a superior variety, sowed grain by grain, and suffered to tiller apart, produced four pounds four ounces of

wheat, whereas another ear of an inferior sort, treated in the same manner, produced only one pound ten ounces, is a proof that it is of paramount importance to select the most productive and farinaceous sorts for seed; it being obvious, that a farmer who would have sown his whole crop with the last variety, would have probably been ruined; whereas, the superior variety would have enabled him to farm with profit." It is hardly possible to enter a field of wheat nearly ripe, without observing that the ears of some of the plants are much superior to the generality of those growing around. Several new and excellent sorts have been obtained, by intelligent farmers making a selection of these remarkably superior ears; saving and growing them apart until the pure stock was increased to serve themselves, and, in time, their immediate neighbourhood. By such means, the Hardcastle, the Hedge-wheat, Hunter's, Heckling's, &c. have been originated; and with manifest advantage to the sowers, so long as the sorts were kept pure, and attention being paid to giving the sorts those most suitable soils which experience had pointed out.

This mode of obtaining improved varieties of corn, so strenuously advocated by Col. le Couteur, has been practised but by few farmers; a general idea prevailing among them, that it is the richness of the land and judicious culture which gives quality, and consequently value to the sample. In this they are partly right; because, though very fine wheat, in a miller's estimation, may be grown on poor land, it is impossible to grow a profitable crop; a great bulk of both straw and grain answering the farmer's purpose better than the high quality of the latter.

But Col. le Couteur seems fully convinced that both these objects, that is, quantity and quality, may be obtained at the same time, upon ordinary wheat land; and this is a result that should always be kept in view by agriculturists. Adapting the sort to the soil, is one means for securing success. The red and yellow wheats answer better on the heaviest clayey loams than the white varieties, which are delicate, and more suitable for lands of a lighter description.

It was for this reason, I chose the yellow

Lammas sort for my bean stubble. Judging from what I saw and learnt of the soil, this sort would prove better than either the Rivet or red Lammas. The ground turned up pretty mellow; but as it lay rather rough and unequal after the plough, it was harrowed down before sowing, and this, lest any of the seed should be buried too deep, which it is liable to be, between the furrows.

The seed was prepared in the usual manner; that is, brined and limed. At every farm there is, or should be, what is called a liming-house; that is, an enclosed end of one of the outhouses having a smoothly-paved floor. One large tub, capable of holding at least six bushels of wheat, is set on a stand twelve or fourteen inches high; this is furnished with a tap at bottom, guarded within by a wicker or straw wisp, to prevent the grain escaping with the brine when drawn off into an underback. The seed is shot into the upper tub about eight o'clock in the evening before it is intended to be sown. As much salt and water, strong enough to float a hen's egg, is thrown up on the wheat as will cover and stand

at least six inches above it. The wheat being stirred, all the light kernels, chaff, smut-balls, &c. float on the surface, and are carefully skimmed off. At five o'clock next morning the brine is drawn off; the wheat is turned out on the floor; quicklime from the kiln is lying ready, and a portion of this is slacked with water, and as soon as it is reduced to powder, it is sifted over the wheat, while it is turned forwards and backwards, till the whole is coated with lime. The seed is next shovelled up in a conical heap, and covered with sacks; undergoing a pretty violent beating while in the heap, which soon dissipates the moisture, and renders the wheat fit for sowing in an hour or two.

There are different methods of preparing wheat for sowing. Some omit the salt, using only clear water as a cleanser, and dry with hot lime. Others use the strong drainage from the dunghill; others, again, pure urine; but this last is dangerous, unless much diluted with water. Some put the hot lime and water together in a tub, stirring and mixing till it is as thick as cream; into this the seed is put, and allowed to

soak a short time; afterwards turned out on the floor in a heap to lie till dry, which it very soon does. There are a few chemical farmers who impregnate their seed with some precipitate of mercury; a dangerous preparation, as well to the sowers as to poultry, and other birds of the air.

But why is seed wheat thus prepared, and what good purpose does it answer? By general consent—to prevent the attack of mildew and smut, and particularly the latter. Both these diseases are now clearly proved to be parasite plants; that is, distinct species of Fungi, which fix themselves on the living plant, deteriorating or destroying both straw and grain. It is very uncertain whether this custom of brining and liming seed was originally had recourse to, for the prevention of the above diseases. It is more than probable that, though our forefathers were well acquainted with the effects, they were wholly ignorant of the causes of either smut or mildew.

In Queen Elizabeth's time as related by the ingenious Tusser, it was a general custom to

draw the wheat seed; that is, by laying it on a table, and drawing with the hand the good from the bad grains, or *vice versa*, This was a tedious process, and causing delay at a busy season; no doubt, floating off the light wheat in water was a ready suggestion, and drying it again by means of hot powdered lime, was as naturally suggested. That the preparation of the seed by coating it with caustic lime, was soon afterwards considered as a remedy or antidote against smut, seems feasible, from its having been so long and so steadily practised. But whether the lime and salt were only first employed as a protection against birds, and against insects in the soil, is questionable; as, at the time these ingredients were first used, the real cause of the maladies were unknown. The process, however, is still recommended by those who are well aware of both cause and effect, because they know that, as both caustic lime and salt are inimical to vegetation, they think that the *sporules* or seeds of the fungi may be partly, if not wholly destroyed, by one or other; more especially as the seed is so completely exposed

to the influence of both during the process of brining.

In order to have a correct view of the possibility of the seeds of fungi invading the living structure of a wheat plant, it must be understood in the first place, that these *spori* are both impalpable and invisible individually; and in the next place it should be known, that vegetable membrane is not a solid, but a vascular body or substance; every part being composed of numberless cells and openings. The spori, when ripe, are blown about in invisible clouds, and, alighting on every object, whether animal, vegetable, or mineral, and whether fluid or fixed, remain and die where they fall; or, if on a congenial substance, and under a favouring state of the atmosphere, germinate and come to perfection. It is from this seizure and growth of the fungi upon the leaves and straw by one species, which causes mildew, rust, or blight, as it is commonly called; and by the lodgment of the spori of another species in the interior of the capsules which corrupts and changes the healthy milk or meal into a black or grey stinking powder,

called smut, so much dreaded by millers and bakers, and so depreciating to the sample of the farmer.

As the disease called smut, attacks the grain in the ear long before the latter is shot from among the involving leaves, it is contended that the seeds of the fungus cannot fall into the capsules while enclosed among the leaves; and therefore suppose that the seeds are in the soil, and are taken up by the roots and conveyed along with the sap into the ears. Hence it is said that liberally-limed land is less liable to bear smut than when no quicklime is in the soil.

Sowing broad-cast is most equally performed by two sowers. The stitch, land, or half land sown by A *down*, is sown by B *up*; that is, the ground is gone over twice, one cast forwards, and another back again; and if this be done by two sowers, the grain is more equally distributed. Some clever seedsmen sow with both hands; taking a whole eight-step land at once down, and once up, or two four-step lands in the same way.

Seed-skips or kits are the most convenient to

sow from; they are kidney shaped, and formed of a wide hoop of the best ash or wych-elm timber, kept in shape by clamps and straps of thin iron, and by which the bottom is also kept in place. They hold about a bushel, and are mounted with a wooden handle for the left hand on the outer side, and by an iron hook on the inner concave side, for receiving the belt worn over the right shoulder of the sower, and by which the kit is carried on the left side with the greatest ease. Some of these kits have a wire grating fixed in the lower end for collecting any small seeds of weeds which may be among the corn—such as charlock, poppy, or cockle, and are particularly useful in sowing barley. These kits are far more convenient than the cloths or sacks used in some parts of the country.

The next field I had to sow with wheat was a clover ley. It had been mown and carried in the previous June; and not mown a second time, but eaten down by sheep. In sowing a clover ley, particular attention should be paid to ascertain beforehand, whether or not slugs are prevalent in the stubble. If the summer

has been wet, those animals are very likely to abound; and if they do, they will very much endanger the crop, unless some precaution be taken to destroy them, or prevent their attacks on the young plants. The most destructive and effectual application is fresh lime, spread pretty liberally over, and harrowed into the stubble a day or two before the ley is ploughed. If no lime be employed, the slugs are turned down under the furrows, where they lie safely, and live on the green herbage buried with them. But the young leaves of wheat are their favourite food; and soon they find their way to the surface on nights, to prey upon them, and retire to their holes again as the morning dawns. It often happens that their presence is not discovered, until the disappearance of the young plants calls attention to their depredations; and then the only remedy to save the crop is by sowing hot lime over it during night, while the slugs are feeding, and which occasions considerable expense. The caustic lime has a surprising effect upon those skinless creatures. If thrown on them in sufficient quantity, their

death is certain; and the least atom falling on any part of their bodies, instantly sends them to their retreats, where they lie till their wounds are healed; in the mean time, the plants grow out of their way. Rolling the field during night, has been recommended as a means of killing the slugs by pressure; but this has little effect; the elastic conditon of their bodies renders them proof against injury from mere pressure. It should be known that lime is only hurtful to slugs, snails, worms, &c., while hot and dry; after the first shower of rain, it is no longer offensive to those animals.

The lowest corner of the field I am speaking of, was infested with a good many slugs, a great majority of them not larger than linseeds; and these, from being nearly invisible, are the most to be dreaded. I therefore gave the corner a good dressing of quicklime, which proved beneficial, as well in banishing the slugs, as it was afterwards to the crop.

A new implement, called a *presser*, has within the last twenty years been invented to secure the young wheat from the depredations of slugs.

It was observed, when these were numerous, that they hid themselves by day under the surface, and came abroad through openings in the creases between the furrows; and it occurred to the observers, that if the spaces were firmly consolidated, mechanically, it would prevent the egress of the enemy. This was a rational conclusion; as it is impossible for such an animal to make a way through closely compacted earth. A short heavy roller, mounted with heavy cast-iron angular rings, nine inches apart, was therefore constructed, and drawn after the ploughs, so that the rings fitted into, and pressed down each crease, and the weight of the whole machine operated to make the whole of the ploughed surface much more firm for sowing upon and for the action of the harrows.

But besides rendering the surface impenetrable to the movements of the slugs, the presser produces another effect particularly favourable for the instantaneous and healthy germination of the seed. Wheat requires a firm bed to strike its first fibres into, and never succeeds if it be laid in light, puffy soil; because, in the last

case, it never can maintain a sufficient hold of the ground; and besides, weeds are very apt to rise with wheat laid in too light. It was to prevent these consequences that suggested the idea of pressing the ground before sowing and rolling, or treading it with sheep afterward. "Laying in wheat heavy" is an old agricultural rule; and this should always be, if possible, accomplished either by the moist state of the soil, or by mechanical consolidation after sowing. Treading firmly and equally by sheep driven repeatedly forwards and backwards over each land or ridge, is as effectual as any other means to which a farmer can have recourse.

My ley was neatly ploughed with light wheel-ploughs drawn by three horses; but it might have been equally well done by swing-ploughs and two horses abreast. The furrows were about five inches deep, and nine in width, and the whole turned up very mellow. Having neither a presser nor drilling machine, I contented myself with first rolling down the surface to bind the furrows closely on each other, to prevent any seed falling too deeply between;

and, as a further precaution, put on the harrows before sowing, to raise at least an inch in depth of fine mould to *hale* the seed.

The proper depth at which seeds are deposited, is of the utmost consequence; they may be buried, or they may be laid in too shallow; and in no other part of a farmer's business are both these errors oftener committed than in the ordinary way of sowing ley wheat upon the firm and naked furrows as turned off the plough. Such of the seeds as fall down between the furrows are covered too deep, and those which chance to rest on the upper surface, are either harrowed into the creases between too thickly, or covered too thinly where they lie. It is for this reason that the surface should be harrowed before sowing; and it is for the same reason, that drilling corn is so far preferable to sowing in any other way; and merely because the seeds are all deposited at a regular and proper depth.

The manner of rooting exemplified in wheat and all other cereals, shows decidedly how necessary it is that the seed be deposited at a pro-

per depth. The stem is jointed, and consists of from seven to twelve in the whole; the lower ones are near together, and as they rise in the air, grow farther and farther apart, so that the longest bears the ear. The two or three lowest joints are those whence the roots are emitted; the first or lowest is attached to the kernel, and produces the first fringe of fibres, which are called the seed-roots; the second joint emits the second fringe of roots, and which becomes the principal to ripen the ear. If the seed be laid at the proper depth, say one inch below the surface, both sets of roots will be near together, and exactly where nature intends them to be. But if the seed be buried three or four inches deep, it germinates and puts out its first fibres as above stated, and the space between the first and second joints becomes *unnaturally elongated*, in the shape of a slender pipe, the second joint stopping at about an inch beneath the surface, and there throws out the principal roots to perfect the plant. As soon as these second roots are formed, which is always sooner or later in the spring, the first are useless and wither away. Now,

although the plants may not be entirely lost by deep sowing, they are preserved at an unnecessary waste of power; and remain in jeopardy of having the slender pipe destroyed by insects in the soil before the principal roots are formed.

By harrowing down my field before sowing, I made sure that not any of the seed would be buried, and by raising a good bed of loose mould, it was then fit for either drilling or broad-casting. I borrowed a drill for a day, and finished five acres. The rest was broad-casted and harrowed in, and all finished in pretty good order; the furrows being struck up, and the water furrows cleared out. Thus was finished the wheat-sowing season.

Had the season been very wet, and the ground unfit for the action of either drill or harrows, it might have been good management to have dibbled the wheat; which, under such circumstances, is the usual resource; and an excellent plan it is, as well for saving seed—for regularity of distribution—and for the important particular of getting in the seed in proper time. This business is performed by men, attended by children.

The men have a dibble in each hand—walk backwards with a foot on the flag of each furrow, along the middle of which the holes, about one and a half inch deep, are made, and into each of which two or three grains are dropped by the children. The dibbles are about two and a half feet long, having a crutch handle at top, and the bottom formed exactly like a plumber's soldering iron, only somewhat more pointed; the stalk is slender, but stiff. The planting is finished by the harrows, horses walking in the furrows, if the ground be very wet.

My next proceeding in the fields was fallowing up the wheat stubbles. One field was intended for beans; another of a lighter description was to be fallowed for turnips. That for beans had been half dressed for wheat, and was in pretty good condition: it was therefore ploughed the usual depth, and laid ready for harrowing down when the planting season arrived. The other field intended for turnips was ploughed as deeply as possible; and the heaviest end of it was laid into *clasp-bouts*, a manner of ridging performed by the plough; and this for the purpose

of keeping it as dry as possible throughout the winter.

This is a practice which should never be lost sight of by the heavy-land farmer. The action of frost upon clayey soils, has the best effects in ameliorating and preparing it for the reception of seed. An old idea is, that it is also enriched by frost; but this is purely visionary. It is its drying and decomposing action which improves the staple of the land, and thereby facilitating all operations of the plough, harrow, and all other implements. The good effects of laying heavy-land rough in winter, either by the plough or spade, has been unaccountably followed by the light-land farmers, much to their own detriment, and seemingly without their being aware of the circumstance. The humid riches of land is as soon exhaled and exhausted by the sun and dry air, as it is by any kind of crop; and therefore being at pains and expense to lay light soils in ridges, or by repeated turnings exposing the staple to the sun and air, is impoverishing it for no agricultural purpose. It has been a custom in the five-course shift, to sow

oats after wheat, on light land; and the preparation for the seed, was breaking up the wheat stubble in the autumn, in which state it lies till some time in February or March, when it is again ploughed and sown. Now a far better scheme would be, to set the scarifier upon the stubble, just moving the surface to cut up the weeds, and harrowing it down. Remaining in this state till sowing time, it would then come up fresh and moist, and the oats would start with the greatest vigour. Harrowing, and even rolling stubbles as soon as the crops are off, is a useful practice; it causes many small weeds to rise and be destroyed by the next operation, which would otherwise remain sound, and rise with the next crop.

In the turnip field on which I meant to turn in my little flock, I noticed a dip in one corner, retentive of water in wet seasons, and from which there was no very visible outlet. I noticed that the nearest ditch was cut through a bank of gravel, and which appeared always dry. It occurred to me that, although the gravelly bank was much higher than the loamy dip, by

digging a deep drain from the latter to the former, a *swallow* might be gained, which would constantly absorb all the water which at any time might be collected in the loamy hollow.

I therefore first sunk a cess-pool six feet deep, and five feet in diameter in the lowest part of the hollow, and from that digged a trench through to the ditch where the gravel was exposed. The cess-pool, and the drain therefrom, was then filled with clean stones gathered from the land, and laid in without any order, but just as they happened to rest on each other. The body of stones was raised to within one foot of the ploughed surface in every part except the cess-pool, which was covered with only six inches of fine gravel, and through which we ploughed.

I found in this, as in all similar cases, that the plan pursued was quite effectual for drawing away surface water. And it may be stated as a rule in draining, that if there be very wet and very dry spots of ground near together, a rumbling drain laid from the first to the last will probably lay the whole day.

The whole art of draining consists in obtaining

a right knowledge of the causes why one portion of the surface of the earth is wet, and retentive of moisture, and another not. The surface is composed of various strata, some of which are pervious, and others impervious to water. The surface is, moreover, variously elevated and depressed; and, as water always finds the lowest place, if there be no obstruction to its downward course, we find natural pools in the hollows and dry porous earth on the knolls. These circumstances are not always present. We often see dry valleys and springy hills; but this depends on the character of the surface strata and subsoil. Where there is much undulation of the surface, many of the eminences are clay; and any depression on these heights are receptacles for water. To drain such pools it is only necessary to lay a course of earthenware draining tubes into the nearest ditch. But many valuable fields are worthless from the abundance of land-springs. These proceed from porous strata laying between strata of a more dense or clayey quality; and, as these often alternate with each other, and *crop out* at different heights on the sloping side

of a hill, occasion much expense and labour to drain it thoroughly; as in most cases, a line of drain is required for every springy spot. As the sources of these land-springs are always above the place where they ooze out, a drain to catch the water must be made above the wet spot, and opened down to the surface of the bed of clay over which the water percolates. This trench, filled with stones or coarse gravel, and led away off the bed of clay, will for ever prevent the water appearing on the surface. Where several of these land-springs issue out one above another on the sloping side of a field, a good plan is, to open several diagonal drains across the slope to catch the downward currents; by which means the water may be checked in its course, and prevented flowing to the surface. It sometimes happens that the strata of clay and gravel are so thin, or lay so near to each other, that a long iron dibble driven through the upper strata of clay will let off the water from the upper drain. It was this perforation of the upper sustaining bed of clay by dibbles, that gained Mr. Elkington so much honour and emolument in

his system of, and for his instructions in draining.

In fixing the direction of drains, whether formed above or under ground, a fall must be obtained, and into the nearest natural outlet. Very great care must be taken, however, that the fall from the source to the outlet be not *too precipitous*, for otherwise the drain, however formed, will soon become choked up, in consequence of a rapid current always carrying sand and other loose matters before it, till it accumulates against some obstruction, when the drain is no longer useful. A fall of one foot in fifty, is fully sufficient for every under-ground drain.

Draining-tiles of different forms are extensively used in some parts of the kingdom, and chiefly employed for conveying water under the arable surface from a higher to a lower level, but not acting as receivers, or as collecting the water from the ground through which they are laid, unless they are also covered with stones or rough gravel; they are also useful for laying under gateways, for connecting ditches or water-courses.

The most difficult land to drain is a dead level, and from which there is no natural fall or outlet for water. We often see meadow land of this description of strong tenacious soil holding surface water, which deteriorates the herbage, and consequently is useless or injurious to cattle, and particularly to sheep in the autumn months. Such lands should be surrounded by deep ditches, or the surface should be laid into eight-step lands and ridges by the plough, taking a crop of oats, and therewith laying it down again with the best permanent grasses, the furrows collect the surface water, and these, hollow-drained, keep the surface pretty dry; and when such kind of alluvial land is constantly under the plough, the ridges are repeatedly *gathered*, and never levelled again; the annual ploughings being made from furrow to ridge, and from ridge to furrow—the latter never being filled up.

As land-draining is one of the greatest improvements which can be accomplished to secure the success of cultivation, every method or mode of executing such labours should be well and clearly understood, before any great project of the kind be

undertaken. A knowledge of the different strata or geology of a country is of great assistance to the drainer, often enabling the director to drain many acres at a comparatively small expense. Many wet and worthless spots may be effectually laid dry by merely digging a pit at one side, and filling it with stones.

The next affair of importance was putting my sheep on turnips. I had to compare my flock with the winter-keep I possessed, so that from the moment I began feeding there should be a constant and sufficient supply, without waste and without want. I had one score of early Dorset ewes, recently bought in; one score of fresh South Down six-tooth wethers; and three score of South Down ewes, to which a ram of the same breed had been put about the beginning of September.

Now, calculating that one hundred sheep usually eat an acre of good turnips in a week, it would follow, that if I had put the whole of my five score of sheep on turnips at the beginning of November, they would have consumed the whole of my nine acres by the middle of Jan-

uary, or rather before; which would have been disastrous management, because the flock would have been destitute of green succulent food at the very time the ewes and lambs are most in need of it; namely, in February, March, and April. I therefore began with caution and drafted them on, in such parties as would eke out the turnips till the spring grass came forward.

My early Dorsets began dropping their lambs about the tenth of November; and I then carted in the hurdles, and laid them ready for being set up in folds on the white turnip side of the field. Swedes, being much hardier, and not running so soon to flower, are always reserved to the last.

The hurdles used for folding are the common five-slote, light-framed ones, generally made by woodmen of willow, ash, or any other poles which will split easily. Most farms in the south of England possess a piece of coppice, or hedges, or pollard trees, whence a supply of poles for hurdle-making and stakes, and headers for hedging, are obtained. In arranging farms, provision should always be made for supplying an

annual store of fencing stuff. Truncheons of the common crack-willow are planted by the sides of ponds, ditches, or rivers, or on any corner of damp ground, whether there be water or not. These are kept as pollards, and yield a crop of poles, &c. every six or seven years. In hedges, too, there is usually a mixture of willow, ash, Spanish chestnut, oak, and other forest trees, which afford a few poles for hurdle-making, when the hedges are cut down to be remade; but this intermixture of forest trees with the hawthorns is not to be commended; for such hedges are seldom good fences. And far better it is to have an enclosed piece of coppice planted for the use of the farm, than have such kinds of plants scattered about in the hedges.

In my own case, I took to twelve dozen, which had been made on the farm the preceding year, and for which I paid at the rate of eighteen shillings per dozen.

In folding turnips, my practice was this:—beginning at the upper corner where there was a gate leading out of a grass field—I first pitched a row of hurdles the whole width of the field,

taking in two eight-step lands; a row was also set against the hedge, to prevent the sheep getting into the ditch, and leaving their tail-dress there, which would have been lost. I next set three cross-rows, at the distance of about twenty-four paces from each other. The hurdles are expeditiously set by what is called a *fold-pitcher* being an iron dibble, with a wedge-shaped point, and of similar size and form as the pointed feet of the hurdles. In setting, the first hole is made at random, close to the hedge; the hurdle is raised and placed in the desired direction—the other foot marking the place where the second hole should be made, in which the hurdle is fixed. Close beside the second hole, a third for the second hurdle, which, being introduced, the other foot marks its own place, and so on to the end. When the hurdles are set, a small wreath of willow, or other flexible shoot of a tree, called a *cap* or *coupling*, is slipped over each two adjoining heads, which keeps them from being rubbed down by the sheep.

About the twentieth of November, I turned in the first fold six or eight of the Dorsets,

which first dropped their lambs, and which were joined by the others as fast as they lambed. It is always supposed that ewes lamb more safely on turf than after they are put on turnips; because, as they are naturally greedy, they are apt to overload their stomachs, and impede or render more difficult the act of parturition.

The whole score of Dorsets had dropped their lambs before the twelfth of December, eleven of them bringing two lambs each; one ewe lost her lamb, but had another given her, which she brought up very well. When the first fold is eaten off, and the bulbs pretty well scooped out, the sheep are admitted into the second fold, and the dividing hurdles are carried forward to enclose another fold in advance. As soon as the lambs take to eat the leaves readily, openings are left between the hurdles to allow them to range over the whole field; and, in order that the ewes may be kept improving, they have every day two feeds of trough meat allowed them. This dry meat is composed of the best and sweetest hay, cut into fine chaff, and mixed with pollard and a sprinkling of salt, of which the

ewes and lambs too, as soon as they are old enough, are very fond.

As these early lambs are intended for the Easter markets, and their dams as soon after as possible, every thing is done for them to keep the whole improving. On cold wet nights they are driven to, and have their dry meat with hay in addition, in the sheep-house, and taken to the turnip field in the morning. Of course, this division of the flock is preferred in every thing, until they are joined by the Down couples, when they all go together for the remainder of the season. The progress over the turnips is by two lands down, and the same breadth up again. These alternations of folding, make the removal of the hurdles much more convenient; and, as the turnips are eaten off those parts, the bottom of the bulbs, which the sheep cannot reach, are picked out of the ground by the shepherd and his boy, to be eaten by the wethers, when they are turned in to follow after the ewes. This takes place some time after Christmas, according as it is calculated the turnips will hold out.

This business of attending the sheep while on turnips, occupies the whole time of a man, with a boy occasionally, together with what is usually a part ofthe same labourer's task, namely milking, or suckling the cows morning and evening.

My cow-stock consisted of only six in-calvers; a number quite sufficient for the size of the farm: they had the run of the pastures on days, but brought into the yard on nights, where they were served with a little hay or straw in cribs. When near calving, they had their hay in their places in the cow-house, to accustom them to their own places, when they are all put in together to be milked.

It is a very necessary thing for a farmer to make a judicious choice of his live stock. In this he is, or should be guided by the quality of his pasture land. If it yield very rich herbage and be firm under foot, he will choose his cows from the Devon, Hereford, or large Short-horn breeds; because these are only suitable for the richest land; and if he have any idea of tying them up to fatten, when no longer fit for the dairy, these breeds answer his purpose better than smaller framed animals.

Poor, or light-land farms, where the pasturage is neither rich in quality nor abundant in quantity, the smaller kinds of both sheep and cattle should be preferred; such as Ayrshire and Welsh cows, and South Down sheep. Or if any of the larger breeds are particular favourites, choosing the smallest individuals of that breed may answer the purpose of the poor-land farmer.

The improved Short-horn breed are celebrated as well for their milking, as for their fattening qualities. They are highly prized by cowkeepers about town, and by dairy farmers and graziers in the richer districts of the kingdom. And yet it is remarkable, that this famous breed is scarcely ever met with in many of the southern counties, owing to the prevailing notion that they are only profitable on the richest land. This is certainly true of the largest Teeswater Short-horns; but as the improved Short-horn breed may now be had of any size, at least of very moderate size, no farmer therefore, however inferior the quality of his land may be, need debar himself of this excellent breed of cows.

It was from this description of cows I chose my half dozen; and had no reason afterward to regret or repent of the choice I had made.

The number, as well as the breed of cows best adapted to any farm, depends on the purpose to which their milk can best be applied. The products of a dairy are cheese and butter, to both of which, the breeding of pigs and the fattening of pork and bacon are closely and constantly connected. On rich grazing farms at a great distance from markets, the manufacture of cheese, and the breeding and feeding of pigs is found the most convenient and most profitable business. On the same description of farms, in the near neighbourhood of cities, or manufacturing towns, butter is made instead of cheese; and, if not too far from market, is found a more profitable way of disposing of the milk: although a more nice and laborious process, it requires the greatest cleanliness and care.

But there are many farms near good markets where neither good cheese nor butter can be made, in consequence of the natural poverty of the pastures. Here, a stock of small cows may

be kept; but their milk is so thin and inferior, that it yields neither a sufficient quantity nor quality of either cheese or butter. In such cases, the farmer finds it most economical to turn all his milk into the shape of veal. This business of suckling calves, requires much less attention than dairying; and neither pork nor bacon is fed except for the farmer's own use.

To the latter description of farms, another branch of suckling is sometimes attached; and that is, the manufacture of house-lamb. This is an exceedingly profitable business when well conducted, and where a sufficient number of Dorset and Wiltshire ewes are kept, and so managed, as that at least one-third of the dams be constantly in milk. This is a distinct branch of a professional shepherd's duty; and there are but few who thoroughly understand it. Constant attendance is given the lambs, which are constantly kept in a warm house, are suckled at least four times a day, as early as four in the morning, and as late as eleven at night. It is a work of much drudgery, and without intermission; and the shepherd must have at the same

time a clear head-piece, to know the capacity of every dam in the flock, and the condition, age, and character of every lamb. The sheep-house is a low, thatched building, the floor being divided into various compartments, for keeping the suckled and unsuckled ewes and lambs apart.

From the very moderate size of my farm, together with the middling quality of the land, dairying was quite out of the question with me. The manufacture of either cheese or butter, would have required larger buildings, a more numerous herd of cows, and far more extended pastures of richer land. For neither good cheese nor good butter can be made, unless milk enough be produced in the course of one, or at farthest, in two days, to be put together either for the churn or the press.

I therefore found, that under the circumstances of my farm and its situation, in respect of surrounding markets, and with a the view of making the most of my cow-stock, I saw clearly that suckling calves for veal would be the most eligible plan I could pursue. There were several concomitant circumstances which urged

the adoption of this design. My farm lay at no great distance from an extensive tract of dairying country, in which butter was the staple commodity and principal object of the tenants. Of course, comparatively but few calves were weaned; and fewer still fattened for the veal butcher. Their young calves were therefore disposed of to sucklers; and I, among the rest, could buy whatever number I wanted, and at prices varying from fifteen to thirty shillings each, according to the quality or the distance from whence they were brought.

As the whiteness of veal is one of its highly valued properties, in the estimation of both the butcher and consumer, feeders always endeavour to ascertain, in making their purchase, whether the calf will turn out white-fleshed or otherwise. This is judged of by the clearness of the white of the eye, and of the palate and other parts of the mouth. This, as I have many times proved, is not an infallible criterion, but it is the best we can have recourse to. Some breeds have whiter-fleshed calves than others; and some bulls are famous for getting white-

coloured veal; others the contrary. These matters, though trifling in themselves, and not to be acquired without considerable experience, are nevertheless not to be disregarded by the suckler.

A cow-house for suckling may be either single or double. If single, the cows are ranged along one side, and the calf-pens are placed behind; but if it be a double cow-house, the cows stand at each end, and a rank of pens are built across the middle between the cows. These pens are raised at least one foot from the floor, being boarded and pierced with many holes, to allow moisture to drain off, as *dry cleanliness* is particularly necessary to preserve the health, and promote the thriving of the calves. The pens are enclosed by boarding four feet high, and of different sizes, to hold one or several calves. Some farmers keep every calf shut up separately, and with scarcely room to turn themselves, thinking that by such solitary confinement, they thrive faster than if they had more liberty, or were disturbed by others. In each pen there is a little manger or trough, for holding pounded

chalk for the calves to lick. It is thought that this has a tendency to whiten the veal; but the use of it is to correct the acidity of the milk which sometimes happens to calves on a change of milk, producing inward fever and dysentery, which must be counteracted by frequent doses of gruel.

Fattening calves are put to the cows twice every day, viz. at six in the morning and at six in the evening; and at each time allowed to suck their fill. New calved cows with a great stock of milk sometimes require to be suckled three times a day for the first week after calving. The oldest calf has always the fullest share of the milk, to push it forward for market; and the moment there is the least redundance of milk, another suckler must be bought in. And it is an invariable rule, constantly to apportion the number of calves to the quantity of milk. No calf will pay for suckling, if stinted at its meals; and therefore it is advisable to have always a little to be stripped from the cows, after the calves have had their fill, than that any of the latter should not have enough. Stripping

the cows as clean as possible twice a day, must be carefully attended to, otherwise the quantity of milk gradually falls off. And if it happen that there is a want of milk, the oldest calf must be sold, even if it be not quite complete.

Calves so fattened, are ready for the butcher in from eight to twelve weeks, ten weeks being the most usual period; at the end of which time, if they have gone on well, they will weigh from seventeen to twenty stones of 8lb., exclusive of what butchers call the *offal*. The smallest calves, if completely fattened, are always more saleable, and fetch higher prices per stone, than large ones, weighing from twenty-five to thirty stones. Age, however, that is, two months at least, is necessary to allow the veal to become sufficiently ripe, palatable, and wholesome: at less than that time, the meat is flabby and unwholesome, and, if suckled for double that period, is only then fit for making soups and jellies.

Some farmers, however, think it most profitable to suckle calves to a large size, and their reasons are two; namely, that a calf improves

faster and with less milk after it is ten weeks old than before; and if the milk of two be given to one, it saves the first cost of the second calf. These arguments are just; but they are not generally acted on, because the price of large veal is always comparatively low; and as much is lost in the price of a calf six months old, as would have bought two sucklers. The condition and capacity of the milch cows, however, must always govern the owner as to the number of his calves, and the size to which he may wish to fatten them. Towards the end of the suckling season, when the milk is falling off, *one* only, or *two*, may be made completely fat; whereas, were there two or three calves to share the reduced stock of milk, all would be starved, and no profit accrue. These circumstances determine and regulate the proceedings of a farmer who wishes to convert his milk into veal.

Throughout the suckling season, the cows have the run of the pastures on days, and are allowed a little bit of hay in the house while suckled. Calves soon begin to nibble soft sweet hay, or lick up a little bran, pollard, or

barley-meal; but these invariably deteriorate both the colour and quality of the veal. The management of the cows, as to the time they take the bull, &c., must be regulated with reference to the times at which it is wished they should calve; but no certain rule can be laid down on this head, save the general one of endeavouring to bring the greater number in to meet the spring grass; but one or two before, and one or two after that time, may be most convenient. A good milcher will fatten at least two calves of sixteen or eighteen stones each, and sometimes, in luxuriant pastures, half a calf more, before she is quite dry. The profit of a cow kept for suckling calves, within the influence of the London, or any other good market, is usually estimated at about £12. per annum, on an average of years.

On small farming establishments, and where fattening veal, or making cheese or butter, is more profitable than breeding, few calves are weaned; but when a favourite breed is sought to be reared, it is best to wean two or more together. These are allowed an adequate share

of their mother's milk, morning and evening, but not allowed to take it in their own way, but out of a pail. The quality of the milk is gradually lowered, or mixed with gruel, &c.; and as soon as possible they are turned into the orchard or other small enclosure, until they forget their natural propensity to sucking, when they may be put to go along with the herd. Where there are no convenient enclosures, weaners are turned very early among the cows; and, to prevent them sucking, are armed with a headstall of leather, beset with sharp spikes, to hurt the cows, and compel them to drive away the calves: a dangerous and unnecessary custom. Another plan is to have a thin flap of wood, three inches wide, by six in length; in the upper hedge of which a dove-tailed notch is cut, to receive with a little force the membrane between the nostrils, whence it hangs over the upper lip. This prevents sucking, but not grazing, and generally answers very well.

I revert to the sheep now chiefly on turnips: and the first thing to be noticed of them is *cutting*; that is, castrating and docking at the

proper age. This operation should be performed in dry weather, and when the lambs are about one or two weeks old. Some old shepherds are guided, as respects the time, by "Moore's Almanack!" looking to "the signs" of the moon's dominion on the parts of animal bodies! This is a mere whim, and need not be regarded, unless the whole affair be left to the shepherd, in which case his prejudices must be complied with. It is needless to detail the purpose or effects of castration on male animals intended to be fattened. That it is necessary, is obvious, from the antiquity and universality of the practice; and, in the case of lambs, if the usual precautions be taken, it is done with but little risk. Anointing the wounds, and keeping them moist with lard is the only application required. Docking, that is, reducing the length of the tail to about three or four inches from the rump, is done for the personal comfort of the sheep, and cleanliness of the fleece; for when grown up, they often suffer for want of the necessary trimming behind. House-lambs are never either cut or docked.

During the lambing season, the ewes require constant attendance ; some may need assistance, and this should be promptly given. Young ewes do not take to their first lambs kindly, and often require to be held to, or confined with their lambs, until mutual affection and knowledge of each other take place. There are many other little attentions which a flock of sheep requires from the shepherd, and therefore constant inspection is necessary.

I had reason to be satisfied with the success hitherto attending my little flock : above one half of my ewes brought couples ; and there were only two of the wethers which, drooping after they were put on turnips, showed that they had a touch of the rot. This disease is more general in some seasons than in others, and in some places more than others. If sheep have been bred on dry or hilly pasturage, and removed from thence to lower and irriguous pasture in the autumn, they will very surely be rotten ; and if in any place a flock be kept on dry ground, during spring and summer, and be turned upon damp meadow ground in autumn, ten to one

but the greater part will be infected with what is commonly called the rot. The cause of the malady is well known; the action of the liver being destroyed by myriads of small insects, called flukes: but how they gain access to that organ is not well understood. It is supposed, however, that they inhabit damp, swampy grass-land, and, being invisibly small, are taken into the stomach with the food of the sheep. From their extreme minuteness they pass, it seems, through the membranes of the alimentary canals, and fix themselves upon, and within the ducts of the liver and other viscera. Dry food and liberal quantities of salt are recommended as the best preventive; but a better one is, to take care that the flock be never allowed to graze for any length of time upon suspicious ground, especially in autumn.

One of my ewes suffered from foot-rot; but as soon as this was perceived, she, with her lamb, was removed to a dry hovel till she was cured. This disease is a cankerous sore, appearing between the claws of the feet, and exhibiting an appearance of proud flesh, most painful

and distressing to the animal. The sore must be reduced and healed by the application of a caustic, which proves effectual in a week or two. This malady is said to be infectious by treading in each other's footsteps; so it is always a rule to keep the ailing sheep by themselves.

Pole-evil is a disease to which sheep are liable, but much more frequent in rich grazing countries, than in those of an opposite character. It is an inveterate sore which breaks out on the crown of the head of polled sheep, or at the roots of the horns of horned breeds. I have observed that the Lincoln and Leicester breeds are most subject to this complaint; and, as the sores are always much irritated by flies in the summer, it is difficult to keep any healing salve upon the sore, without, what is sometimes had recourse to, cotton or linen caps, to cover the whole upper part of the head.

The scab, or shab, is a cutaneous disorder common among sheep. This is certainly contagious; and therefore the first affected should be removed to an hospital to be cured. Repeated applications of strong tobacco liquor is the usual remedy.

There are several cheap and effectual preparations compounded by druggists for the cure of the ailments of sheep, cows, &c. which are well worth a trial; as I have always used them with success. During summer, the common blue and green flesh flies are sad and dangerous pests to sheep. The sweat from their bodies, lodging in the fleece, becomes corrupt in the hollow parts; there the flies lay their eggs, which are soon hatched into maggots, and descending to the skin, soon eat their way through, causing extensive and excruciating sores, which, if not attended to, and the maggots dislodged, proves at last fatal to the sheep. These attacks can only be prevented by the vigilance of the shepherd, who, as soon as he sees the flies hovering over the sheep, he to keep them off makes a mixture of train-oil, thickened a little with powdered brimstone, and, to give it colour, mixed with pounded reddle. This mixture, smeared along the back from head to tail with a painter's brush, keeps off the flies by its powerful scent. When, however, the maggots have gained a footing, their presence is soon known by the restlessness of

the sheep, tearing the wool with their teeth, or running to hide in the deepest recesses of a wood, or in the bottom of a dry ditch, where, if they are not found and relieved, will soon perish. To get rid of the maggots, the wool must be clipped off the sore, and dusted with hot powdered lime, or well washed with strong salt and water, to dislodge the maggots; after which the sore is covered with a coat of tar. To save disfiguring the fleece by this mode of banishing the maggots, other remedies have been invented which are at once fatal to the worms, healing to the sores, and, in their application, not injurious or destructive to the wool. Quicklime in powder, dredged liberally upon and around the parts affected, is one of these remedies: and a fluid is sold by druggists which, being poured upon the sores, kills or banishes the cause, and promotes a cure. But I have always found prevention better than any of these topical applications.

I have run out these remarks on the diseases of sheep, although some of them happen at a much later period of the year than that at which I am

supposing myself to be writing an account of my operations in the order in which they occurred. My sheep were all on turnips by the tenth of February; but before that time, I had been proceeding with the other business of the farm. The second week of January happening to be dry, gave me an opportunity of harrowing down a field intended for beans. The harrows moved about two inches in depth of the surface, which was quite sufficient for the operations of either drill or dibbles. As the weather continued dry, I began sowing the common Tick-bean with the drill; but wet weather setting in, it became necessary to finish the field by dibbling. The drill was of the simplest construction: it had a sole formed of a square block of wood, pointed before, and shod with iron; into this two or three uprights are morticed, and these also into a horizontal beam at about twenty inches above the sole: the latter is two feet long, and the beam is about six and a half feet. At the hinder end of the beam and between the handles, there is a hopper or funnel-shaped box, which holds about half a bushel of seed. In the bottom of the

hopper there is a brass pinion, fixed on a revolving axis, which is moved by a lateral wheel which, bearing on the ground, revolves as the machine is drawn forward. The space between the sole and the beam is boarded on each side; and from the under side of the pinion to the heel of the sole, there is a tube through which the seed descends into the furrow made by the sole. The machine is drawn by a pony or horse attached to a horizontal cock, having many notches for shifting the point of draught, and extending transversely two or three feet from the beam on the near side. The use of this is to permit the drilling of a four-step land of a tender soil; the horse always walking in the furrows. The brass pinion revolves against a strap spring, which, being regulated by a posterior screw, allows the seed to escape thicker or thinner as the sower thinks proper. After drilling, the harrows are passed once or twice over to cover the seed.

Drilling is performed lengthwise of the lands or ridges; but setting or dibbling, is done by a line across. This work is generally performed by stout boys and women. In both cases the

rows should be full eighteen inches apart. To each line two dibbles are placed, if the ridges are narrow; or four, if wide. The line is set by gauge sticks at each side; the seed is carried in an apron, and dropped one or two in each hole made by the dibble in the right hand. I have always found that paying the people *by the day* at such work, is better than paying them by the acre or by the bushel; as by the latter plan they are induced to be careless.

Beans thrive best if planted on a stale furrow —at least, on a firm and rather tenacious subsoil. Their principal downright root takes a strong hold; and if they can get out of the reach of drought, the better they thrive, and the more prolific they are. There are several varieties of field beans, all of the smaller sorts. They are preferred for their hardiness and prolificness. Early ripening is a great recommendation, as, when intended to be followed by wheat, they cannot be too soon out of the way of the ploughs.

Their stiff and erect position renders them excellently adapted for the row-culture; for during their growth, both horse and hand hoes may be beneficially employed, so that not a

weed need be left either to exhaust the land or injure the crop. It is believed that the foliage of beans dropped and ploughed into the land proves excellent manure.

I sowed no peas; not only because I had no convenient and suitable piece of ground for them, but that they are always a precarious field crop. If the summer prove dry, their growth is soon checked, and they are immediately preyed on by the shrimps (*Aphides*), which quickly destroy the crop: or if showery weather happen immediately after they are reaped, they are seldom got into the barn without considerable loss by reason of the pods bursting.

In some of the heavy districts of the country, beans and peas are sown together. The beans support the peas; and if the season be favourable, the return of both are abundant. In market, the mixture is called *polts;* and is usually purchased for feeding pigs, or split for horses. In the same districts peas and oats are frequently sown together. When thrashed, they are easily separated by throwing; and the straw makes excellent fodder.

My next spring business, was getting in my oats and barley. It has been a question among farmers, as to how soon these crops may be sown with safety. Such is the variableness of our seasons, that it is impossible to fix on any month, far less any day of a month, for the commencement of these labours. It must in every year depend on the nature and state of the land. In light sandy districts, sowing either oats or barley may be begun early—say by the first of February; but in heavy retentive soils, it but rarely happens that the ground gets sufficiently dry for the operation of the plough before much later in the year. And in all cases it is much better to delay stirring the ground for a week or ten days, than to enter on it when too wet.

In the whole routine of farming there is no circumstance which requires more attending to than that of *the state of the soil as to the moisture it contains* previous to stirring it with the plough. There is a mechanical consistency among the earthy particles of the staple which is particularly suitable to the growth of plants. For some kinds of plants the soil can hardly be

too porous; but the generality affect a close bed to root in, after it has been thoroughly reduced to a state of fineness by labour. In the process of doing this, if there be the least excess of water in the soil, the portions disturbed by the plough immediately slip together again as compactly as ever, excluding every particle of air, and preventing all access of that necessary element to the roots of plants.

If ground be ploughed in too wet a state, no after management by any other implement will recover its suitableness for the healthy growth of vegetables. I have often seen parts of fields which were too wet when ploughed, and though equally rich with the other parts, not only fail to yield any crop in the same year, but refuse for three years afterward, owing to the difficulty of reducing the soil into that friable state fit for the reception and nourishment of plants, after having been once stirred into the condition of mortar; as it then becomes, when dry, hard as a brick, and equally impervious to both air and water; without both of which no plant can thrive.

It therefore behoves the farmer to be particularly cautious, lest he should begin to sow any kind of white corn before the soil is dry enough to receive the seed. The sooner, however, either oats or barley are sown after the first of February, the heavier the crop is likely to be, besides ripening a week or two sooner. For a long course of years these kinds of grain have seldom been sown till some time in Lent; hence they are usually called *Lent-corn.* But as this solemnity varies in its commencement, between the sixth of February and the ninth of March, it sometimes happens that one or both these sorts of corn are sown before Lent begins. This, however, depends entirely on the state or condition of the ground, and whether or not the turnips be out of the way. Some farmers intentionally delay sowing, lest late frost should check and weaken the young plants; but this is groundless timidity, as I have invariably observed that the earliest sown crops, notwithstanding they have been repeatedly exposed to sharp frosts after being above ground, have always turned out the heaviest crops at harvest.

Young barley is certainly a delicate plant, and it often loses its healthy green colour in wet and cold seasons after it is above ground; but this sickly yellow hue soon goes off on the return of warm weather.

Oats are generally sown before barley, merely because the ground is sooner ready for the reception of the seed. If a wheat stubble be chosen, this is first fallowed up in autumn; and, as soon as the land is dry enough in February or March, and promises to harrow well, it is sown. The quantity of seed varies from four to six bushels per acre, according to the condition of the staple, and the kind of oat preferred. Some sow the seed on the naked furrows, just as turned by the plough, trusting to the harrows to cover the seed, and smooth the surface, which is afterwards regularly rolled down. A better plan is to break the surface with a drag harrow before sowing, and finishing with the common harrows and roller.

There are several varieties of oats commonly cultivated in the British Isles. Those which are plump and short, white, thin skinned, and

heavy, are most valued for mealing, and for feeding highly-kept horses. Of this description, the angus, common white, the potatoe, and brew sorts are most in request; but for common use, the small black, black Poland, black and white Tartarian, are most frequently sown. The small black is suited to poor land: the straw is short, but the yield is mostly abundant; and there is no fear of injury, even if they are housed or stacked wet. The black Poland is a fine grain, but very liable to be eaten by wire-worms if sown on ley, or on a foul stubble.

When old grass land is broken up, the first crop taken is either oats or peas. The latter does very well, whether drilled or sown broad-cast, if a dripping summer follows; but common white, small black, or Tartarian oats, are a much more certain crop. When these are off they may be followed by beans, if the ground be strong enough, and these succeeded by wheat, turnips, and barley, with which the ground may be laid down again with permanent grasses. If, however, peas be taken for a first crop after breaking up, then beans must be omitted in the rotation of

crops before the ground is turned again into pasture. Drilled crops are always most eligible on land recently broken up from pasture; because this allows of a quicker extirpation of the root-weeds always found in grass land.

If the field to be broken up is of inferior quality, the course of cropping is as follows, viz. oats, fallow for turnips, barley, clover, wheat, turnips, and barley again, with which the ground is laid down again for depasturing.

The next important business of the spring months is barley sowing. As soon, therefore, as there is an acre or two of the turnip ground cleared, the plough may be introduced. Land, which has been regularly folded, is left in a remarkably clean state: every green weed, as well as the turnips, have been devoured; the surface is usually battered smooth with the trampling of the sheep, and liberally covered and impregnated with their droppings: the usual and most valuable effect of feeding off a green crop.

The tail-dress being mostly on the surface, deep ploughing is avoided, lest it should be

buried out of the reach of both barley and grass seedlings; for much depends on both these receiving the greatest possible excitement at first starting. If the surface be moved to the depth of four inches, it will be found quite sufficient; but this must be rendered as fine as possible by every practicable means. If the weather be wet while the turnips are feeding off, the ground breaks up very cloddily: in which case, if the roller does not reduce the clods, it will require to be stirred again and again with the plough till the requisite fineness is obtained. It is bad management and useless labour to throw either barley or grass seeds upon a cloddy surface; for unless these seeds are closely embedded in loose soil, they rise imperfectly and irregularly. And if irregular in growth, the sample can never be *even*, and of course of less value in market.

In order to secure a simultaneous germination of barley in dry seasons and on very dry soils, some farmers steep their barley seed for a few hours before it is sowed. But this is very seldom necessary, because no grain strikes root so readily as barley, even when laid in the dust.

As much of the tail-dress is liable to be kicked into the furrows between the lands, it is a good plan to open the former previous to ploughing the latter, as a means of distributing the droppings more equally.

If the ground turn up pretty dry and mellow, the harrows and roller may reduce the surface to the requisite fineness; but if not, the plough had better again be employed. When the seed furrow is given, and the field is intended to be sown broad-cast, it is usual to sow one cast before the harrows, and another after; otherwise the seed would be deposited in the hollows between the furrows, which would be improper. For my own part, I prefer sowing both casts of seed after the ground is harrowed smoothly down, because there is no risk of any of the seed being buried two deeply, or deposited irregularly. The seed is covered by a *'bout* of the harrows, and immediately rolled down preparatory to sowing the grass seeds.

If the barley be intended to be drilled, the seed furrows are first harrowed down; and when the drilling is finished, the seed is covered by the

harrows, and afterwards rolled to receive the grass-seeds.

The quantity of seed usually sown on an acre is three bushels, if broad-casted, and half a bushel less if drilled. On good land the barley plant tillers much; sometimes from twenty to thirty stems rise from the same seed. This tillering is always in proportion to the richness of the soil: so that less seed is required for rich, than for poor land, provided the seed be deposited in more open order, as may so conveniently be done with the drill.

The due proportions of seed-corn per acre should be well considered and fixed by farmers. All the different sorts tiller more or less; and although this is always in proportion to the high culture and richness of the soil, there are limits within which this property of the cereals must be in all cases confined. That this may be clearly understood, it is necessary to premise that the purely natural state of the plants is not such as proves most beneficial to the cultivator. A single grain of wheat, if planted on rich land, would arrive at considerable bulk: its roots

would be numerous—the stems many—strong and tall—the ears large, and containing much seed. But from the isolated situation and luxuriance of such a plant, it would be very liable to be blown down and blighted early in the season; and even if it escaped these injuries, the grain at harvest would be found bulky, but of very inferior quality, abundant in bran, but deficient in flour. Were a similar grain planted on very poor soil, it would be diminutive in all its parts: the roots would be few and feeble; one stem only would be produced, which, together with the ear, would be short, and contain but few seeds, but these would yield flour of the finest quality.

Hence it appears that wheat had better be sown too thickly than too thinly on good land, because the rivalry among the individual members of the crop moderates the growth of the whole; the stems occupying the entire surface, rendering mutual support to each other, as well against wind as against the early attack of mildew. Thick sowing on poor soils is most eligible, because, as each seed throws up but one or two

stems, there should be a sufficient number to occupy the surface, and prevent the growth of weeds.

The same rules apply to the other descriptions of white corn: but for land of middling fertility, experience has long determined the quantities of seed of each; and three bushels of good barley is considered to be quite enough for an imperial acre of ground.

The barley being sown, harrowed in, and the surface rolled, the next step is mixing and sowing the grass seeds. Sometimes red or broad clover is only sown; as pure clover, if well got up, is always valuable. If this be chosen, ten pounds at least per acre should be sown; and if the crop is wished to be thick, for the purpose of growing it fine, four or six pounds more may be added. If broad clover be sown thin on rich land, the stalks are so rank that, though the most nutritious, they can but with difficulty be drawn through the rounds of an ordinary rack: and therefore by sowing thickly, the clover, though much thicker in the swathe, is much finer in quality, and preferable for every purpose of either rack or manger.

But seeds sown with barley, or upon wheat land in spring, are usually mixed in the following proportions; viz. six pounds broad clover, three pounds Dutch clover, two pounds of yellow clover, and three half-pecks of Italian or Pacey's ray-grass: these, being well mixed together, form the necessary quantity for one acre.

Machines are used for sowing clear clover or turnip seed; but they are not so suitable for mixed sorts, owing to their unequal size. They can, however, be very equally sown by a practical seedsman. The most regular method is to sow from a wooden bowl, or pottle measure, delivering the seed from the hand by jerks at every step, by *pinching*, as it is called; that is, by taking up as much seed as can be held between the thumb and two forefingers of the right hand, and throwing it with force, not towards the ground, but obliquely upwards into the air. By this motion and direction the seeds are scattered: and by the cotemporary act of throwing *here and there* as the sower proceeds, they fall very regularly on the intended place.

Another way of sowing is also performed with

great exactness. As much seed is grasped in the hand as can be held with the fingers closed. The thumb acts as a lid, which is suddenly opened at every cast of seed and fall of the left foot: this and the right hand going together, in the same way as in sowing corn. The sudden opening of the thumb permits the escape of just as much seed as the sower deems sufficient for the space he is sowing.

A drift of four yards in width, sowed twice over, that is, forwards and backwards, is as much as a sower should attempt to cover, in order that every part of the surface may be seeded: for nothing looks worse, or causes more regret and reprehension, too, than to find, when too late, that the sower has not done his duty. If, therefore, the lands or ridges are four or eight steps in width, the sower must go once down and up on the first, and twice down and up on the second: and so in proportion, on ridges of other widths, or where no ridges are marked at all, as in the case of laying down grass lawns, or where the turn-wrist plough is used.

The above mixture, as noted in quantities, is

as low as can be bestowed. Many farmers increase the quantities of each, lest there should be any deficiency: and it is certainly a false economy to grudge a little excess of seed.

Broad clover, like most other plants, soon gets tired of the same field to grow on. Sown on its favourite soil, a calcareous loam, it is only a biennial: that is, lives only two years; but if sown too frequently even on this soil, it will scarcely live one year. The immediate cause of this is not well ascertained. The old idea is, that the first crop absorbs and exhausts *all* those peculiar qualities or food in the soil which are fit for the clover, so that none is left for the support of the second crop, especially if the second follow closely on the first. But another idea has been recently broached to account for the failure of the second crop. It is, they say, not that the peculiar pabulum or food is all devoured by the first crop, but that this first crop discharges into the soil *from its roots* some deleterious quality, which acts as poison to succeeding crops of the same kind.

Which ever notion be the right one, is of no

consequence to the farmer. Experience has long ago proved that broad clover will not succeed on the same spot unless an interval of at least *five years* elapse between the sowings. But as seeds invariably follow barley, and as this last is, upon turnip land, introduced into the rotation every fourth or fifth year, it is necessary so to manage, as that no loss be sustained by the too frequent repetition of broad clover.

In the four shift course of cropping, therefore, if the above-mentioned mixture of seeds be chosen for sowing, say in 1838, then in 1842, when the same crops are repeated, broad clover is entirely omitted, sowing only larger quantities of Dutch and yellow clover instead; and in 1846 the broad clover is again brought into the course: by which means this plant only occurs at intervals of eight years.

When the seeds are sown as above described, they are covered by a single *tine* of the harrows landwise, and afterwards rolled smoothly down across, which finishes the work.

It was not till the 15th of April that I finished barley sowing; the turnips having held out till

a little before that time. The white ones began to run early in February, but were partly kept down by letting the sheep run over them from time to time. The Swedes do not run so early, and therefore for this, as well as for their superior hardiness, are always eaten off last.

Before the turnips were all consumed, I had sold off a considerable number of lambs. Easter happening on the 22nd of March, which is the grand season for the demand and consumption of this kind of live stock, I drew them off as soon as they were marketable. The Dorset lambs averaged about ten pounds per quarter, and sold very well. The ewes which thus lose their lambs, require to be milked for a few days after till they get quite dry; and were still fed with trough meat without stint. A few of the forwardest wethers were also every week sent off, in order to reduce the flock and prolong the time of the turnips.

Topping the turnips, as soon as they begin to run, is advantageous: the bulbs remain much more sound and juicy for the use of the sheep. Besides, when the central stem is broken, several

others rise in its stead, and so increase the green food fo the lambs. Letting the tops grow till they may be mown, is a bad plan; for though the half-withered tops are eagerly eaten by the sheep, the bulbs are not benefitted. The shells or pieces of the bulbs dug out of the ground, and become withered on the surface, are much relished by the fattening sheep.

When the turnips are finished, the remaining sheep and lambs are turned upon a good pasture; and those, whether ewes or wethers, intended to be fattened, are kept apart, and still supplied with trough meat to get them forward. Such as are intended for store stock, if any, are put away by themselves.

When the Lent corn is sown, or sooner if possible, the next care of the husbandman is to get his clover fields and meadows intended for mowing, into proper order. This is by picking off stones or other obstructions to the scythe, and then rolling the whole before shutting up.

Next commences the preparation of the turnip land. This has already had one ploughing in the autumn; and another to turn the furrows

back in the spring. Now the open furrows between the ridges may be filled in, and cross ploughing performed. The state of the land, and its condition as to foulness, with couch or other root weeds, will determine how often it need be ploughed, drag-harrowed, or rolled, to get it clean and sufficiently pulverized. When this is accomplished, the field is drawn out into lands, to regulate the carting on the manure.

The business of drawing out a fallow field into ridges or lands is necessary, not only for the equal distribution of the dress, but also with regard to the nature of the soil. If the land be retentive of moisture, and liable to be drenched in wet seasons, the stitches or lands should be narrow; but if naturally dry, they may be wider: say eight yards, which is the most convenient size; as, when much wider, there is time lost in turning at the ends.

This drawing or stitching out a fallow, is a favourite task of a ploughman: it is to him a pleasing amusement, and he prides himself much on doing it accurately. Some farmers are so nice, as to have double-breasted ploughs, mounted

with a projecting side *marker*, to regulate the width of the ridges; but this is despised by a clever ploughman, who, using only two white sticks to mark his four or eight step lands, does the work with sufficient exactness.

Fallowing is a necessary process of farming. Its purpose is to get rid of the root-weeds, which always accumulate and take possession of the land under a course of white-corn cropping. Fallowing is indispensable on another account: some soils partake so much of the nature of clay, that though they may, every second, third, or fourth year, be reduced by labour to a state of pulverization fit for the reception of seed, yet, after yielding two or three crops, the land reverts to its former compact and obdurate state, when it must again have a summer fallow.

In some parts of the country the clayey staple is of so cohesive a nature, that it requires to be fallowed every third year. Beans and wheat succeed each other alternately; the ground being fallowed and dunged for the wheat. As a change, clover is occasionally sowed on the wheat, and is allowed to stand for a year or two before it is again broken up.

As the culture of such a soil is always difficult and expensive, by reason of its stubborn and untractable consistence when dry, many powerful machines have been invented and constructed for subjecting this description of arable land into the usual routine of less tenacious soils. But none of these machines have quite answered the purpose, because the reduction of such clays depends more on the decomposing action of the weather than upon that of any mechanical force that can be applied. The strongest ploughs can only work when such soils are too wet to be moved; unless, indeed, a critical time can be seized when neither too wet nor too dry in the autumn, so that the winter frosts may operate in in its amelioration, and that harrows *only* may do the necessary business in the spring. Much judgment is required in fixing the first time of stirring such soil; for all ultimate proceedings to be effectual, must depend on the state of the land when first moved. Alternating frost and thaw, showers and sunshine, are the principal atmospheric agents; and these, assisted by the plough, harrows, and roller, throughout the

summer, kill the weeds, reduce the clods, and prepare the land for the reception of the dress, and seed early in autumn.

Fallowing light friable soil is comparatively easy; repeated ploughing and harrowing till the staple is brought to sufficient fineness, and every weed destroyod or picked off, is all that is required. Such land is adapted to turnip culture, and the sooner in the summer the fallowing is completed the better. Ground intended for Swedish turnips, should be cleaned, dunged, and ready for sowing at the end of April, and from that time throughout the month of May; and for common whites, the best seed time, from the middle of June to the end of July. I have had very fine crops sown as late as the tenth of August; but this happened in consequence of the autumn being showery and warm.

Although fallowing is only thought necessary for the destruction of weeds, and for the amelioration and reduction of a tenacious soil, it is asserted by some learned authors, that the process has other and more beneficial effects. The repeated exposure of the soil to the sun and air,

say they, extracts from it those hurtful qualities which have been discharged into it by previous crops, and which have so poisoned the staple, that no plant of the same kind can flourish in it, until those deleterious exudations are exhaled away by the sun and air; and this, they affirm, is the real useful effect of fallowing.

Others again, and who are strictly practical men, maintain that, fallowing is a wasteful and unnecessary practice; for, if by drilling the crops, and such care bestowed, so as no weeds are allowed to usurp the cultivated surface, fallowing for a whole year can never be requisite. As proof of this they instance the practice of gardening, where no fallowing is either performed or thought necessary; nay more, that there are many, and as successful farmers as any others in the kingdom, who never have a whole fallow on their farm, trusting entirely to the operations of the horse and hand hoe, and to careful picking up of root weeds after the plough by women and children. It is true, that these farmers are lavish in the use of rich dress, so

that their land is always in good heart, and their crops are forced as it were into luxuriance, and never suffer from the usurpation of weeds. Neither is the land which is cultivated in this way, ever liable to be hardened by the summer sun, so as to make any extra ploughing necessary.

But all heavy soils which are not adapted for turnip culture, and only fit for wheat, beans, peas, and clover, must be frequently fallowed for wheat, and land suitable for turnip, must always have a half-year's fallow, as a preparation for that crop, merely for the purpose of freeing it from root weeds. And this I consider is the main purpose of fallowing, as I am quite certain, that the more the soil is turned and exposed to the sun and air, the more it is exhausted of its best qualities for nourishing plants. On this account, subsoil ploughs are excellent implements, as they stir the staple, and may bring the weeds to the surface, without *turning the furrow,* to be parched by the action of the sun, and at the same time render the soil equally friable for the turnip seed.

Ground intended for this invaluable crop, being sufficiently reduced, freed from weeds, and drawn out into lands, has next to receive its coat of dress. This is usually supplied from the stables, cow-houses, feeding-houses, pig-styes, &c. accumulated in the farm-yard during the preceding winter, and thrown up into large heaps, to ferment about a month before it is carted into the field. Dung consists of a good deal of dry straw along with animal matters, and to get it in order to lay on the land, it must be thrown up in heaps, either in the yards, or in the field where it is to be used, not only to prepare it by fermentation, but to kill the seeds of corn and weeds, which must necessarily be collected where cattle are foddered with hay and straw of different sorts for several previous months. Farmers have been advised to use their yard dung *green*, that is, without fermenting in the yard; but this advice cannot be taken, because, although recently made stable dung, contains a larger portion of vegetable food, perhaps, than it does after it has been fermented in heaps; yet, for the reason above given, namely, its foulness

with the worst of seeds, it should never be so used for corn crops.

When as much dress is made in the course of the winter as suffices for the summer fallows, the business of the farm is well balanced. Whatever may be the system—whether the three, four, or five course rotation—as many head of live stock must be kept on the farm, as already observed, as will make dress enough for the fallows as often as they occur. When the farm-yard dung runs short, recourse is had to folding sheep upon the fallow; which though not so well for the store flock, perhaps, is of vast benefit to the wheat crop that follows. Folding with hurdles is begun at one side of the field, and continued progressively up one ridge and down another, until as much of the field has been folded as is required. The size of the folds are always in proportion to the number of the flock. When shut in, there should just be room enough for the whole to lie down. The flock is driven into the folds on evenings, and returned to their pasture every morning. During their absence a new fold is set for the flock

to be driven to next night. The superior rankness of the succeeding crop shews to an inch how far the folds have extended.

Carting out dung from the yard is usually performed by carts, or tumbrils, as they are called—because as the shafts are fixed to the middle of the bed by staples, which play into each other and to the front of the body by a moveable bar which, when removed, allows the body to tilt wholly to discharge the contents, or only so far as to permit the load to be dragged out in separate portions—are by far the most convenient carriages for distributing dung equally over fields, more especially after being regularly drawn out into lands or ridges.

Different districts use different sized carts; they are adapted for either two or three horses, the capacity of the last being double that of the first. The larger size is commonly adapted for a team of four horses, either for leading out dung, or carting home corn or hay. The horses are placed two in *Thills*, and two in *Traces*; the two latter being alternately shifted to the loaded cart.

Seven such cart loads per acre are the least quantity that can be called a dressing for any kind of field crop; and as much more as can be afforded. The dung is laid in heaps, at equal distances along the middle of each ridge, by means of a strong prop stick and dung drag. A strong staple is driven into the axletree of the cart, into which an iron hook mounted on one end of the propping stick is inserted, the other end resting on the ground. On this stick the load is tilted, and the dung is drawn out by the drag; the size of heaps, and the distance between being regulated by the practical knowledge of the carter; his *gage* being the length of the cart and one or two horses between the heaps.

The heaps are spread and shaken into as small pieces as possible; next ploughed in, and the seed sown thereon, either before, which some prefer, or after the surface has been levelled by short-tined harrows. Instead of harrows, the roller may be used for levelling the ploughed ground with advantage; because the seed bed cannot be too fine, nor is the dung harrowed out more than is necessary for covering the seed when sown.

The sowing is performed by *pinching*, as has been already described in sowing clover. Three lbs. per acre is sufficient, if the seed be good; and when sown, should be covered with one tine of the harrows, and then again rolled smoothly down.

In thus sowing turnips broad-cast, several attending circumstances are necessary to insure success. First, that the soil be perfectly clean and reduced to the finest possible state; secondly, that the dung be in the best state when ploughed in; that is, short, moist, and still retaining the declining heat of its previous fermentation; thirdly, that the dung be ploughed in as soon as spread, and new seed sown while the ground is yet moist; and lastly, finishing with the roller, which pulverizes and closes the surface upon the seed.

Under these circumstances the seedlings appear on the fourth and fifth days; and if the weather be favourable, grow away rapidly. This, however, is a critical time for the plants, because it is in this stage of their life they are vulnerable under the attack of the fly (*Haltica*).

If fallen upon by these pests, the plants will be all devoured in the course of two or three days, and there is no remedy but to begin to re-sow the field; and this re-sowing often requires to be repeated several times.

It is very remarkable, that on some lands the turnip fly is never seen, or even known; in others, it is an annual visitor, and a great annoyance to farmers. It is a particular description of rich yellow loam which produces plants never preyed on by the fly: but on all kinds of clayey, light, sandy, or gravelly soil, the fly is in every year more or less prevalent. The economy of the insect is still but imperfectly known; and no effectual remedy has yet been discovered to prevent their depredations.

The nearest approach yet made to secure a middling crop, is to sow the seed in alternate drills; the first and third very thickly, to be eaten by the fly; the second and fourth rather thinly, to stand for a crop. The thicker the seedlings stand together, the more palatable they appear to be to the insects; and so while they are busy with thick standing drills, the others grow

out of the way. This cannot be done well in broad-cast sowing; because if doubly or trebly seeded, if the fly come on, they devour the whole; and if they do not make their appearance at all, the business of hoeing becomes so difficult, that it is rarely executed with propriety.

But turnips are most successfully cultivated in drills, and which is performed thus:—The ground being thoroughly worked by the plough, harrow, and roller, the surface is laid into open furrows twenty-seven inches apart, by a double-breasted plough. The dung is next carted on and spread regularly over the furrowed surface. The double-breasted plough is next used to split the intervals between the open furrows, thereby burying the dung in the bottom of each open furrow, and over which the seed is intended to be deposited. When the dung is thus covered a light roller is drawn over to flatten the crowns of the ridges in which the seed is to be laid.

The seed is drilled along the centre of each ridge, by a common turnip drilling machine, and deposited about an inch deep, and covered by a light iron rake attached to, and drawn

after the machine; or, when the seed is drilled, covered with a common light harrow, and afterwards rolled down if necessary.

Another mode of drilling is by having the dung equally spread on the level surface; and then throwing the surface into clasp *'bouts*, by the common plough. Along the middle, and in the crease formed by the double furrows, the seed is drilled, and afterwards covered by the harrows and roller. By this method, although the seed is laid immediately over the dung, and consequently receives the greatest benefit from the contact, yet the plants are raised too high off the common surface, and therefore is a much inferior plan to the foregoing, which opens furrows to receive the dung in the first place, and thereby depositing it at the due depth for all other crops in following years, as well as for the turnips in the present.

Hoeing turnips is a very material part of their culture, as it is impossible to have great crops unless the plants stand singly, and at due distances apart. Broad-casted turnips are more easily and expeditiously hoed out by an expert

hand than those sowed in drills; merely because the latter, standing in closer array, impose a more cautious use of the hoe, besides a great deal of thumb-and-finger regulation. Drilled crops are, however, best, as admitting the operation of the horse-hoe; and which, on land free from stones, is of vast advantage in loosening and keeping the intervals free from weeds; which labour, among broad-casted plants, must all be done by the hand-hoe, though not so effectually. On stony land, the horse-hoe is unmanageable and almost useless. And I have often heard extravagant praise bestowed on the light loamy-land farmer, (who had not, perhaps, a stone on his farm) for the clean neatness of his drilled crops, while the stony-land farmer with equal skill, and with much more laborious exertions, passes unnoticed by superficial observers.

Unluckily, too, in looking over agricultural books, we find that they have been chiefly written by men who have been fortunately situated upon rich and easily cultivated land, where every improved implement could be used with effect, sanctioning its utility, and forcing the use of it

in quarters where it would be worse than useless, with the certain consequence of bringing odium on those who failed in its application. Thus the drill husbandry, which is only adapted to light, stoneless, or very finely cominuted-land, has been recommended for land of a very different character, and where all such attempts must necessarily fail.

From these observations, it is obvious that the farmer who is situated on a gravelly, half-clayey soil, must not think of drilling his crops, but do the best he can on the old broad-cast system. Nor need he fear to proceed on this less nice mode of culture; because if he use every endeavour to free his land from weeds, drilling will seldom be necessary.

I have known many farmers begin with what is called the "Improved husbandry," that is, by drilling all the crops—horse-hoeing—swing-ploughing with two horses abreast, adopting every new practice, buying every new implement and go on swimmingly and successfully for a few years, fully proving the superiority of the improved system, and the excellence of the new implements, and yet at last suddenly give up

the new processes, and return to the old. This change was in consequence of the discovery that, although the improved system yields higher profits, it requires more time and of course more expense, except in the article of horse-power: and that though the old or common methods of cultivation are neither so profitable nor so pleasant to look at, these deficiencies are in some measure compensated by the simplicity and straightforward course of the different processes. The laborious operations of farming are usually executed by homely hands: and therefore the less precision and dexterity are required in the execution, the more likely are the various labours to be performed properly.

It is necessary to add, however, that this main-chance farming is a very different thing from careless slovenliness. Though drilling be not adopted, the land must nevertheless be kept as clean as a garden, by thoroughly working and cleaning the fallows—by hand picking, pulling, and cutting up noxious weeds, as well in the early stages of the growth, as after the crops are carried. In short every opportunity should be seized to encourage the germination of seed-

weeds which may be in the land, and thereby prevent them rising with the crop: and this is chiefly by harrowing the stubbles in the early autumn to raise a loose mould to bring up a birth of weeds which will soon have to be ploughed down and destroyed.

But to return to the culture of turnips: it is quite certain that, as heavy crops may be raised by sowing broad-cast (if the dress be sufficiently abundant and regularly spread) as by drilling: but there are other reasons for drilling turnips not yet adverted to. To ensure a crop of large bulbs, machines are invented, not only for sowing the seed, but also for sowing lime or bone-dust at the same time. Both these substances are accessory to the rapid growth of the plant; the one as an immediate exciter, and the other as a powerful and much more permanent manure. Placed in contact with the seed, too, the latter can hardly fail to rise quickly and strong; and consequently be less subject to be preyed on by the fly, or liable to other unfavourable changes of weather. In fact, if turnip seedlings do not rise quickly and strong, there is little chance of their withstanding the fly;

for it is invariably observed, that sickly or diminutive plants are much more palatable to the insects, than those of ranker growth.

If, from the heat and drought of the summer, the soil has been worked into the condition of dust, the sowing should be delayed till rain falls; as but little hope can be had of success, if the seed be laid in a dry and parched soil.

Turnips, so indispensable for the fattening of sheep and lambs, are only cultivated on land which is naturally dry, and firm enough to bear the sheep without poaching, while they eat the turnips: for unless fed off, the ground is rather robbed than benefitted by such a crop. The tail-dress left by the flock, together with the previous dunging, forms the grand source of nutriment for the three crops of barley, clover, and wheat, which follow in the three next succeeding years. It is true, however, that turnips may be raised on tender soils to be drawn off for sheep in folds on pastures, or for cattle in stalls; and time enough for the ground to be sown with wheat in the autumn, and have grass seeds harrowed and rolled-in in the spring.

Some farmers who wish to have turnips for

stall-feeding, without losing the advantages of feeding the crop upon the ground, adopt a middle course; by pulling and carrying off every other drill, leaving the remainder to be folded. This may be convenient and judicious, especially if the turnips have been laid in with an extra quantity of rich dung or bone dust.

The same practice is pursued in the culture of mangel wurzel. This highly useful beet is invariably raised in drills twenty-seven inches apart; the intervals are kept free from weeds by the hoe during summer, and when full grown, about the end of October, are first stripped of their leaves which are eaten by cows, sheep, or swine; and before hard frost sets in, are raised from the ground and carted to the homestead, and there, either piled in a barn or outhouse, or on a dry spot in an orchard, and thickly covered with straw to repel rain, and especially frost, which would be fatal to the roots. The mangel is an excellent winter food for milch cows, and other purposes of feeding live stock: the only drawback on its value, is its liability to suffer by frost, and the consequent impossibility of eating

it off the ground. From its shape and manner of drawing its nourishment from the subsoil, it resists the effects of drought more than most plants; and in hot summers continues to grow vigorously, while almost all other crops, and particularly white turnips, are arrested in growth and almost parched up. For this reason the old Norfolk white field turnip, from its elongated shape and deep rooting, withstands drought better than the round bulbing varieties. The Swedish and Aberdeen yellow, are the hardiest and fittest for fattening stock. The Tankard variety yields much feed, but being easily assailed by frost, should be always eaten off in the autumn. These last are usually sown when it is intended they are to be succeeded by wheat. The white and red Rounds, are fine varieties, and yield abundance of feed; and there is the little early stone or stubble turnip, which, being sown on an early cleared wheat-stubble, produces sometimes a fine piece of spring feed.

While working the fallows, whether for turnips on light land, or for wheat on heavy, during

the months of May and June, there are some other matters which must be attended to, at the same time. One of these is weeding the wheat and other growing crops; thistles, docks, &c. are the principal weeds which require the spud, or the weeding-hook, and particularly the thistles, which become a great annoyance to the reapers. Unluckily, the thistles cannot be checked by once cutting over; they will rise again and again: and of course require cutting down repeatedly to keep them from topping the corn. The work is usually done by women and boys, and may be continued till the wheat is two feet high. The spud is formed like a carpenter's chisel to a five-feet handle, and the hook is bent at an acute angle; the inner and opposing edges being thin, and sharpened like knives.

About the middle of June sheep-shearing begins; and it is well to have this business over before hay-making has commenced. In every parish or district of a sheep-feeding country there is always a band of men called shearers, who are employed in going from farm to farm to shear the flocks. These men wash and shear

the sheep, receiving so much money per score as can be agreed upon with the employer, who also, in most cases, finds them in victuals and drink by the day, and to the supper of which the other men on the farm are usually invited to partake. The shearers charge from half a crown to three and sixpence per score, according to the size of the sheep. The shepherd *winds* the fleeces, which requires some skill in winding them compactly, in order to look well at the fair, or when presented to the wool-stapler, who comes round to buy. As soon as the sheep are shorn they should be fresh marked with the owner's initials. Sheepshearing is a very nice operation; and to execute it perfectly and quickly, requires long practice; the weight of the fleece depends much on the close-cutting dexterity with which the shears are used.

The next business of the summer which occurs, is hay making. This happens sooner or later, according to the situation, the aspect or the nature of the soil. Sainfoin, when cultivated for hay, is usually the first ready for the scythe. It should be cut when in *fullest* bloom. The

flowers do not all come out together; one-third perhaps, flower early; another third later, and the remaining third are later still, and should not be waited for, if the weather be settled dry. About the middle of the blooming is the critical time which should be seized if possible. This usually happens about the fifteenth day of June in the south of England; and nothing but showery weather should delay the cutting after that time. Sainfoin hay is quickly made in fine weather, only requiring to be frequently turned till the whole is equally and thoroughly withered; and when got to this state it should be ricked immediately. If got up in this state, it is the best, most palatable, and most nutricious of hay for horses, deer, and sheep, as well as other cattle; but if a single shower fall upon the crop after it is withered and fit to carry, it is utterly spoilt and useless. This is a great drawback on the value of sainfoin as a forage plant; but when well got up, it amply repays the cost of cultivation. As an autumn pasture it is also valuable; but it requires to be early shut up in the spring, especially from sheep and horses,

which are liable to damage the crown of the plants.

Clover comes next to the scythe; and its maturity for the mower, and manner of making it, is much like what has been detailed respecting sainfoin. To get it up green is a chief point; the swathes are therefore seldom shook out; for as soon as it is thoroughly withered, and the rank juices exhaled, it is fit to go into rick.

Neither sainfoin nor clover should be put up in large ricks, because, as they both should be carried rather too early than too late, there is less risk of a small rick heating injuriously than a large one. A bottom, four yards in width by six in length, will hold from eleven to fifteen loads of truss-bound hay; which is as much as should be put into one clover rick. A bottom seven yards by six, will hold twenty loads; and for every additional yard in length, five loads. The height of a rick should be no more than can be reached by the unloader out of the bed of a cart or waggon.

There is some ingenuity and care required in

rick-building. Hay-ricks are generally set on a bottom of fagots, or some other material, to keep the hay one foot off the ground. The first layer of hay the builder lays round the outsides firmly, leaving the middle hollow; but as soon as the outsides are six feet high, the middle is filled and well trodden, and raised nearly two feet higher than the outsides, at which height above the outsides it should be kept all the way up, ending in the ridge of the roof. This manner of carrying up the rick is necessary, in order that in sinking the layers may remain nearly level; which, as the rick sinks most in the middle, from the greater heat, the layers of hay will be found at last nearly level, which makes binding the hay much more convenient.

Cutting and making meadow hay follows the clover; and as these affairs should be all over before harvest begins, the mowing should be begun with reference to the probable commencement of that busy season. All the clover and hay-ricks should be thatched as soon as they are fairly settled; and the rick-yard cleared up, and bottoms prepared for the reception of the corn.

Haymaking in *fine weather* is one of the easiest and most pleasant of rural labours. It may then be reduced to a regular system of operations, each following in due course, without pause or obstacle in the proceedings. On the first day all the grass cut before nine o'clock in the morning is tedded: in the course of the forenoon it is turned once or twice. In the afternoon it is raked into single wind-rows, each raker making a row of about three feet wide of the tedded grass, and the last operation of this day, is to put these wind-rows into grass cocks. On the second day, ted out what was left untedded on the first day, together with that moved before nine o'clock on this day. Next, the grass cocks are shaken out into staddle-rows four or five yards wide, and the intervals between raked clean. The staddles are turned once or twice in the forenoon, and the grass which was tedded in the morning also, turned once or twice. In the afternoon the staddles are raked into double wind-rows; and the grass that was tedded in the morning, into single wind-rows. The last business is to put the

double rows into larger cocks, and the single ones into grass cocks. On the third day, the business is proceeded with in the same order as before stated, as to tedding, turning, wind-rowing, grass-cocking, double-rowing, &c.; and if there has been a countinuance of fine weather, the large cocks, after having been shook out and well sunned, will be in a fit state to carry on the afternoon of the third day. On every succeeding day, the same routine of operation is continued until the whole crop is secured in ricks.

But in showery weather, haymaking is á most tedious process; and to proceed with it with any thing like satisfaction, is seldom experienced. One special point to be attended to in such seasons, is to see that no portion of the crop be left uncocked on nights, or at any time of the day when showers threaten. In this climate it often happens that if we have a fine dry seed time, the weather changes about midsummer, or soon after, and a showery time sets in, which continues for a month or six weeks. In such showery times we have the wind constantly veering from west to south-west. On mornings

the wind is westerly, with a clear sky and bright sunshine; all hands are called to the hay field; the cocks are shook out, and the staddles are repeatedly turned, and only require another hour's sun to fit the hay for the rick. While a hasty dinner is swallowed, and the horses harnessed, the wind has veered to the south-west; black clouds appear to windward, and before a load is got up, and the exposed hay again got into cocks, drenching showers fall, and drive the labourers from the field. At sunset the sky is again serene, with the wind at west, from whence it will continue to blow till the middle of the next day.

I allude to this state and changeablness of the weather, because I have frequently seen it prevail during hay-time, and to show how my own practice was wrong. Instead of endeavouring to get up the whole by opening all the cocks, a *moderate portion* only should have been exposed; and of this, one load might have been got up in good order; or, if the cocks wanted a little more making, they might have been shook out for an hour or two, and put up again before the after-

noon rain set in. In such a course of weather, haymaking should be proceeded with cautiously; both the mowers and the makers must go on slowly.

When such a course of weather happens, it is always observed that the earliest haymakers are the most successful: and, indeed, had we not to wait for the full flowering of sainfoin and clover, and the same sign on the ray-grass in meadows, the earlier we begin taking an average of years, the better chance we have of getting up hay without rain. This, however, always depends on the character of the spring: if March April, and May, have been dry, June and July are likely to be wet, and *vice versa*. But in this uncertain climate there is little dependance to be placed on the weather of any future period, judging from that which is past: for we have neither rules nor instruments to guide us in such matters. Pulling the ricks should not be neglected; it has not only a neat and finished look, but the weather cannot penetrate far into a well pulled stack. In the rich grazing countries in the centre of the kingdom, the hay-

stacks are mostly circular and pulled so closely that very little thatching is necessary; the crown only being covered with a capping of straw.

It is a very pleasing feeling to a farmer to have his turnips up and once hoed out; and his clover and hay all ricked and thatched before the beginning of harvest. He then can concentrate all his forces, and give all his attention to this most important business of the year's labours. Peas are usually the first ready for the sickle, and are reaped, or as it is called *picked* with a couple of hooks or sickles, one in each hand. As the crop is closely seated upon the surface, the stems are rather torn therefrom than cut. The hook in the left hand serves to raise the straw, while a low and level blow of the right hand hook separates the stems from the ground, and by the alternate action of the hooks the peas are rolled over and over until a moderate sized *wadd* is formed, and then lifted clear off the ground and laid singly behind the reapers.

In some places peas are reaped with scythes: but though practicable, it is a less tidy way of

doing the work. The wadds are repeatedly turned till perfectly dry; when they are forked together in rows along the middle of each land, and loaded on carriages, the horses walking in the furrows; as they should always do when loading corn, especially when two pitchers, and two loaders are employed.

It is a fortunate circumstance if peas can be got up without rain; for if they get wet after they are nearly dry, a great loss ensues from the pods opening and losing the grain. This, however, is only one of the casualties to which all out-door field-work is liable; and which the farmer must place in his profit and loss account. The pigs should be turned upon the stubble as soon as the crop is carried.

The next corn that ripens, if there be no rye, is wheat. This, till within these few years last past, has been reaped either with sickles or hooks. The latter have a stouter blade, with an edge like a knife, and kept keen by a whetstone. The edge of a sickle is toothed, the teeth pointing backward; so that on entering it passes smoothly to collect the handful, and

cuts on being withdrawn. It is this mechanical action of the sickle which, it is said, renders it more suitable for reaping than the hook, which cuts both ways and before the straw is grasped by the left hand. This, however, all depends on the skill of the reaper, who by care need not cut and scatter the corn which he has not a hold of.

The first handful that is cut or pulled, serves to make the band for the first sheaf. The bands are either single or double: single bands are formed of one length of the straw; double ones of two lengths united below the ears. Some farmers insist upon the use of single bands; in order that the sheaves may be as small as possible: for the smaller the sheaves are made, the sooner the wheat is fit to carry. Careless or greedy reapers are apt to make the sheaves too large; and if bound too early in the morning, they are liable to get mouldy in the middle. A sheaf should not be more than from ten to twelve inches in diameter, and bound rather loosely than otherwise, that the air may pass freely through it.

In some countries wheat is cut high for two reasons: first, that the barn may hold more sheaves, and secondly, that there may be opportunity to hockle off the stubble for thatching, or for forming partition walls in feeding yards, or walls round folds. But in the vicinity of large towns, cavalry barracks, or in any place where many horses are kept, every inch of the straw is valuable: and therefore wheat cannot be reaped too closely to the ground. Indeed, with very many farmers, reaping is entirely given up; and a new method called *bagging* is introduced. This is performed by heavy crane-necked hooks, resembling those made for cutting furze. The workman takes half a land, or a drift about four yards wide, and holding the standing corn back with the left hand, strikes close to the bottom with the hook, clearing a strip of about two feet, leaning the cut corn against that which is standing. The workman next begins at the end, where he leaves off cutting, and stepping backward, collects with his hook, and draws after him the loose wheat into a bundle, keeping the butt even against his legs, and when got to the left

hand side of the drift, places his hook under, lifts, and lays the whole upon a band previously made, thus forming one sheaf. Thus every inch of the straw is obtained, and also every particle of the weeds and rubbish growing among the wheat. This clearance of weeds and corn together, is considered an objection against *bagging* by some farmers; while by others it is thought to be an advantage; as getting all the weeds, seeds and all into the barn, where they can be separated and kept apart from each other. It is certain that where straw fetches a high price, it is worth a farmer's while to preserve as much as possible: and wherever bagging is practiced, the crops are commonly heavy.

Of late years mowing wheat is come into fashion. This is only bagging with a more powerful tool. The mower strikes his swathe into the standing corn, and behind him the binders follow, making bands and gathering the cut wheat into sheaves. This is an expeditious way of harvesting wheat; and on this account is judicious. Old farmers think it a slovenly process; but if carefully done, there is no material loss

in it; and the expedition with which the cutting down is performed, and the crop secured in catching weather, is a most material object at such a busy season.

The expense of reaping wheat in the south of England, varies from eight to eighteen shillings per acre, according to the manner of standing and weight of the crop. Storms and contrary winds happening just before harvest, makes a great difference in the facility with which wheat or other corn is cut down. So much is the corn laid in all directions by contrary winds, that twenty or five and twenty shillings per acre are sometimes paid for reaping it.

The sheaves are piled together in *shocks* or *stooks* across the crown of the ridges; six, eight or ten, leaning against each other; and sometimes capped with two other sheaves placed butt to butt, sloping outwards; or they are placed in fours along the furrows, without capping. In fact, there are many ways of shocking wheat sheaves, according as the harvest is more or less showery. In fine weather, sheaves are soon fit to carry: and in wet weather, with the wind

continuing in the same quarter, the shocks often require to be turned.

Machines have been invented for mowing wheat, and are drawn by a horse along the side of the standing corn, a strip of which is cut and laid ready for binding into sheaves. This being bound, another strip is cut, and so on seriatim. These machines are not yet much in use; as they are not much superior to the common scythe. The Hainault scythe has also been introduced for cutting wheat; but neither does this seem to take in this country.

There are different opinions as to which stage of the growth is the most proper for cutting. Some insist that it should be dead ripe; others that it should be reaped while yet green. But the best rule is to begin as soon as the straw is dead *six inches below the ear*. The straw dies from the ear downwards: and as soon as it assumes a yellow hue, it is no longer a conductor of sap, and consequently can give no farther assistance to the grain. When the sap therefore ceases to rise to the ear, the crop may be cut with safety; and besides, when cut in this state, the sample

is always brighter than if allowed to stand till the grain is dead-ripe.

There is always some portion of the wheat crop housed, in order to be ready for thrashing for seed or market; but it keeps far better in ricks, especially if not in perfect dry order when carried. It is certainly a great convenience, however, to have barn-room enough for the different principal crops; and if they can be housed, they should have sufficient field-room before they are carried. When once in a well ventilated barn, they are safe from all changes of weather: the expense of thatching ricks, and of housing them when wanted, is saved; though in ricks the corn is safer from the depredations of mice and rats, if they be (as all corn-ricks should be) set on staddles.

The stands, or staddles, are in shape, either square or octagonal; the base is a frame of wood, or cast iron, supported by conical feet of hewn stone or metal, with projecting caps of stone to prevent the entrance of vermin, and raised at least two feet above the surface of the ground. The body of the rick being thus elevated in the

air, no moisture can be attracted to, or remain in such ricks; and consequently the grain always comes out of them in fine order.

Building wheat ricks requires some practical skill; the exterior is formed of sheaves laid close together, with the butts outwards; and the next layer within, with ears outwards, reaching rather above the bands of the first, and so that the last may have sufficient diagonal bearing upon the first, to prevent them slipping outwards, which they have a tendency to do, unless bound steadily in place by the weight of the incumbent layers of sheaves. The first layer of sheaves is carried over the whole bottom of the rick, and laid regularly from the sides to the middle, where every layer is finished. The next layer is begun upon the first, but laid a little farther outwards, and the sheaves which shut upon these are reversed in position to those of the first layer. This tact of crossing the diagonal position of the sheaves in the interior of the rick, binds the whole more steadily together; and as every additional layer or tier of sheaves overcils the former, till the eaves course is reached, the

central should have a binding connection among themselves to give security to the whole, only the middle need not be so compactly put together as the exterior, which should act like a wall. The eaves course is put out six inches, to bear and throw outwards the bottom of the thatch. When this course is laid, the rick should be all over level, and on this the tiers of sheaves are laid to form the roof. This is gradually drawn in to form a ridge, if a square rick, or to a point, if a round one.

Wheat or other corn-ricks should be thatched as soon as possible after they are built; and if showers happen before the thatcher can begin, the rick should be what is called *rough-thatched;* that is, a coat of straw thrown loosely over the roof.

When corn is put into a barn, it is called a *mow;* and placing wheat in the mow, requires but little art. A bottom is first made of clean wheat straw to keep the sheaves off the ground-floor and to catch the shed grain. If there be a *mowstead,* that is, a boarded partition two or three feet high on each side of the thrashing-floor, the first course of sheaves are placed up-

right against the mowstead, and so set on their butts all over the floor. When the first course is set, the *mower* begins at the farther end, still setting the sheaves upright till within a yard or two of the mowstead, when he turns himself and begins laying sheaves with their butts over the mowstead as far as their bands, and thus completes the second course of sheaves. The courses of sheaves are placed backwards and forwards over the mow, and the front is carried up with the butts outwards, till the mow is eight feet high; after which, the butts of the sheaves are kept in, and on a line with the side of the barn door. The mow is then filled up to the rafters of the roof.

When the mow is firmly settled down, and before thrashing can be commenced, the front of the mow must be cut. This is done with a *hay-knife*, by cutting off the overcilling butts of the sheaves perpendicularly with the outer face of the mowstead; thus leaving a smooth, firm face to the mow, entirely out of the way of the flails, and clearing the whole space of the thrashing-floor, which is a great convenience as well in thrashing as in cleaning corn.

It frequently happens that both oats and barley ripen along with the wheat; oats are geneally first harvested, because they are liable to shed if over ripe, as well by high winds as in the act of cutting and carrying. If oats be very strong and heavy, they are *bagged* and bound like wheat; but in general they are mown with scythe and bow, or scythe and cradle. The latter tool is mostly used for thin or short crops; and a most excellent contrivance and effective instrument it is, in the hands of a tall powerful man. The part called the *cradle* is fixed to the sned or handle, and consists of a standard let in near the heel of the sned, whence four ribs bent like the scythe and ranged right over it, about five inches from each other. These, as well as the standard, are kept in place by stays which are fastened higher up on the sned. The scythe is well *laid out*, so that it cuts strips of the corn fifteen inches wide at each stroke. The cradle receives what the scythe cuts, and is laid, by a *heaving-jerk* of the mower, as regularly in a swathe as if done by hand. It is surprising to see how neatly and expeditiously the work is

done by an expert hand. Three, or from that to four acres per day is usually accomplished by an industrious mower; he of course earns high wages at half a crown the acre; but the men are well worthy the hire, as it is most slavish labour.

The other scythe for cutting oats or barley, differs in nothing from a common grasss scythe, except in having a bow of tough wood fixed beneath the heel of the sned and bent upward till it meets the middle of the sned to which it is bound. The use of this bow is to keep together the cut corn, and prevent it falling over the scythe during the sweep. The corn is laid very neatly in regular swathes by this tool, but it is not so expeditious as the cradle scythe.

Both oats and barley are mown across the lands; not only because the corn in the furrows is easier cut out, but also on account of getting the crop easier together when ready to be carried.

In *making* those crops in the field, it is seldom necessary to turn oats unless rain has fallen and the swathes lie thickly or closely to the ground;

and then gently shaking up, without turning, answers the purpose. Barley requires *bleaching* while in the field; and therefore turning is requisite; and if very full of clover, and the weather unpropitious, the swathes will require turning several times to get it dry enough for the barn or rick.

Raking in oats and barley for carrying, is a labour which, to be rightly done, requires some precision. The swathes lying across the lands, are raked into wadds, so that the horses guided up and down the furrows may pass between the wadds; which as the team moves on are pitched to the loaders upon the carriage. The manner of raking in, is this:—two rakers rake from the furrow and leave their wadds, at a rake's length from the furrow on each side. Other rakers rake from the other furrow, laying their wadd close beside, but not upon the first wadd. Thus every two lands are brought together for carting. In this way the ground is all raked clean; and with two rakers behind the pitchers, clear as they go.

As barley is more scattered in mowing than

other corn, it is the custom to get this into wadds with pitching forks without any raking at all. Pitching forks have two very long tines, and a third, called a *horn*, screws into the base of the others. These three-tined forks are particularly effective in running the swathes into wadds, or pitching corn up upon the wagon, more especially when the straw is short.

By thus getting the bulk of the crop of barley together with forks, and carting it to the barn or rick, it is thus secured, leaving the rakings which are of less importance to be got up afterwards. These rakings are most expeditiously got together by what are called *heel-rakes;* because they are dragged behind the heels of the labourer. The head is of wood, and five feet in length, beset with long slender crooked teeth bent forward, so that they collect all the loose scattered ears, without entering the ground. These drawn across the lands from one side of the field to the other, and emptied at the same places both going and returning, get all the rakings together with very little labour and in a very short time. Where drag or

heel-rakes are not used, the ground is cleared with the common wooden rakes.

It is not customary, nor is it necessary to bind either barley or oats in sheaves, except very heavy crops of the latter. They are carried loose to the barn or rick; and are thrashed in the same condition. In northern countries where labour is cheap, the farmers bind all their corn; because, having but few large barns, the crops are all put into stacks, which are housed as they are wanted; and for the purpose of rick-building, sheaves are much more convenient than loose corn, and, moreover, much more conveniently carted home.

When the white corn is all cut and carried, there only remains the beans and second crop of clover to be got up. The latter is cut and made in the same way as the first crop; though, from the shorter days and decrease of the sun's heat, it requires more field room; but if got up in dry weather it is a most useful fodder, whether for the rack or cut into chaff.

The question has often been discussed, whether or not the land is scourged by taking two

consecutive crops of clover, that is, mowing twice? Mowing the first crop and feeding off the second, is thought to be better management than mowing both; the tail-dress left by the depastured animals is considered an equivalent for the exhaustion of the first; and leaves the land in better heart to yield a crop of wheat. I have many times tried both practices; and I am decidedly of opinion, that taking two crops injures the land much less than grazing both, or only the last. The reason is obvious; the humid riches of the soil are quickly exhaled away from a bare parched surface; but mostly retained if constantly shaded by a thick crop. It is this circumstance which has established the well-known axiom in farming,—namely, that *one heavy crop insures another;* merely, because the ground is kept cool and shady during the dry season. And this is a principal reason why well managed farms have always heavier crops, than such as are mismanaged, independent entirely of the relative natural qualities of the soil. For even on inferior land, if an abundant crop of turnips can once be got, the following crops

of barley and clover will be proportionally great; and if the clover be mowed twice, there will certainly be a fair chance for an abundant crop of ley-wheat. It is however true, that if clover be depastured in a *dripping summer*, the ground does not loose so much of its virtue as if the weather were hot and dry; but as this cannot be foreseen, a safe plan is to mow the first crop and fold off the second, if it must be eaten, in order to obtain the greatest benefit from the tail-dress.

The second crop of clover is sometimes allowed to stand, and is mowed for seed. This in very fine autumns may answer the grower's purpose; but as the seed requires a great deal of labour to thrash, clean, and prepare it for the seedsmen, it is not an object of the main-chance farmer.

Neither is it adviseable to sow home grown seed. I am perhaps, singular in this my opinion, but it is founded on a well known fact; namely, that all foreign seeds, bulbs, and tubers, suceeed better than those of home growth. All cultivated plants enjoy fresh soil, fresh air, and a change of situation in the same latitude. English

clover seed, will take better in Holland, or France, than that of their own growth, and *vice versa;* and therefore it is advisable for the English farmer to sell his own and buy foreign seed, in every case when he can. And whether of home growth or foreign, its goodness should be tested in a flower-pot before mixing up for use.

Harvesting beans is, in ordinary seasons, one of the last of the harvest labours. When the leaves have died and dropped, and the pods have become dry and black, the crop may be reaped. Beans are variously bound; sometimes with rope-yarn-ties, which last for several years; or with straw bands, or, which is more frequently the usage, the sheaves are bound with bands made of the stems. Beans can hardly be too ripe when cut, nor too dry when carted. They are usually put in ricks to stand the winter, in order to be throughly hardened before they are used, or sent to market: old beans are always more valuable than new.

Where any Brank is cultivated, it is usually cut and carried during October. This grain

is commonly raised on *light-land* farms, and on fallows intended for wheat. On land of that description the fallow is worked and got sufficiently clean by the tenth or fifteenth of June; and rather than the field should lie barren all the summer, a crop of brank is stolen from it, while the land is improved rather than deteriorated. The plant affects a dry loose soil, is of rapid growth, and forms a fine summer covering. One bushel seeds an acre, and the yield is from three to six quarters per acre. The price is always near that of barley. Dunging the fallow may be either laid on before the brank is sown, or immediately after it is off; in either way the wheat has the full advantage. And it is an established fact, that better crops of wheat follow after brank, than if no such crop had been taken; a result which can only be attributed to the shaded state of the land in the hot season.

Brank is mown with the scythe and cradle; and lies till it is partly withered. But the stalks are of so succulent a nature that is very apt to heat, whether put in a barn or rick. This heating appears to be necessary, to make the

thrashing more easy, and to dry the grain. Thrashing brank is the easist of all flail work; for the slightest blow separates the grain from the straw. One drawback from the value of the crop is the uselessness of the straw; as it is fit for nothing but litter and to be trodden into dung. This is not an entire loss; but it is, even for litter, not to be compared with the straw of other cereals.

The grain finds a ready market; it is highly prized by distillers, and as food for poultry, pigeons, and pheasants. Its uses on a farm are not very important: it is too hot for horses; and though pigs are exceedingly fond of it, either whole or ground into meal, it should never be given in a greater quantity than one-third brank, ground with two-thirds barley. Administered entire to pigs, it actually drives them into paroxysms of high fever; rendering them restless and extremly noisy.

But brank, however useful it may be even as a bread-corn in the north of Europe, can scarcely be said to hold a place in British agriculture. It is only suitable for light, sandy,

or gravelly soils, where it can be grown on a naked fallow without interfering with the routine culture of more valuable plants; and it is only under such circumstances that its culture can be either recommended or even justified.

While thus clearing the fields of the last of the crops, already operations are begun for getting in the crops of the next year. I shall suppose that two pieces of winter tares were laid in during September, and perhaps also two or three acres of rye for spring feed for couples. These matters I have already adverted to, in the foregoing pages; and now it behoves me to say somewhat of barn management; for this business is constantly going on during winter.

HOMESTEAD OPERATIONS, &c.

There are two circumstances which imperatively urge the farmer to proceed with getting out his corn. The first getting money to answer all demands, and the next is having a constant supply of straw for the store cattle in the yards. This is executed either by thrashing

machines or by the flail. On large establishments machines are indispensable; but on small farms, such as my own, I find the flails just as effective. By proceeding moderately in getting out the corn during winter and spring, I have always to attend market once a fortnight at least. When markets are steady, or even when fluctuating, this is the best plan: for it seldom or ever happens that a farmer benefits himself by turning speculator, with respect to carrying his corn to market. If he hold back under the expectation of a higher market, he will be certainly disappointed; because all others who have the same means of information and the same expectation, meet together on the same day, and consequently lower rather than raise the prices. This is particularly the case in a *pitched* market, in which all the corn for sale is seen at once, and not a sack sold till the market-bell rings at noon. In markets where corn is sold by sample, it is not so easy to judge of the quantity; but a pretty shrewd guess may be formed from the number of exhibitors.

Every farmer who attends a pitched market,

having his corn to carry there, should always contrive to load back with something or other. Sometimes dung is to be had in market towns; or if not, coals or other fuel may be brought for self or neighbours. To those markets belong a set of men called sack-carriers, who unload the carriages and place the sacks in the market; and if unsold carry them to a loft to be kept till the next market day; or if sold and not taken away, to be kept for the buyer. For these services a certain trifling sum per load is paid by the owner or by the buyer. Salesmen also attend corn-markets to do the business of those farmers who do not, or cannot attend to sell their own corn. They are accountable to the owners for the corn sold; and for a certain commission, provide sack-carriers, lofts, and take care of and return the sacks.

There are different sized sacks in use for corn: in some places five-bushel sacks are used, and are called loads; but generally, four-bushel sacks are employed, ten of which contain a load of forty bushels, or five quarters of eight imperial bushels, each *striked* measure.

Thrashing Wheat. — Distant and different parts of the kingdom have different methods of thrashing corn. The labourers employed in the work are called *Taskers;* because formerly they had daily tasks to perform, according to the descriptions of corn they were employed upon. For instance, four bushels of wheat, six bushels of barley or peas, and eight bushels of oats, were considered a fair day's work; whether it was performed in six, eight, or ten hours. Or if paid in money, sixpence per bushel for wheat, fourpence for barley and pease, and threepence per bushel for oats, was considered fair wages: throwing the corn out of the chaff and binding the straw every day included.

Thrashing by the great, or at so much per bushel, is now almost everywhere given up. It is a strong temptation to the men to slight the work, especially when corn thrashes badly, which it is liable to do, if not carried in the best order. And if a man get out the above-mentioned quantities, clean the grain and bind the straw, it is as much as a hard working man should be required to do for the low wages he receives.

Some farmers think throwing the corn out of the chaff every day, is preferable to letting the whole week or fortnight's work lie in the chaff till finally cleaned up for market. The former is by far the neatest and most convenient plan, and most generally practiced. Every day's work should be put up in perfectly dry sacks, and remain till the day before it goes to market; when it undergoes a general cleaning in bulk, and is accurately measured and sacked.

The process of thrashing is nearly as follows:—A rank of sheaves is laid with their butts close to the mowstead—the bands are loosened and pulled off—and the sheaves spread out a little. The thrasher begins at one end, standing at the heads of the sheaves, but not treading upon them. He strikes the sheaves somewhat obliquely; beginning at the ears, and working towards the butt, but without deranging the position of the straw. When a sheaf has been sufficiently thrashed on one side, it is whelmed over, and thrashed on the other; and while thrashing, the workman has the tact of dividing the thick parts of the sheaf by a tip with the point of his

swingle striking a part towards him: and separates also with the point of the swingle pushed from him. Thus when every ear has been exposed, and has received a blow, the whole of the sheaf is repeatedly and gradually pushed forward out of the way—the straw still kept in the first position, for the convenience of binding. The sheaves are thus thrashed one after another, till the whole are finished—the straw being driven to one end, and room made for another layer, the floor next the mowstead being cleared for the purpose; the grain and chaff from which being swept into the middle of the floor.

When as many sheaves are thrashed as will make up the day's work, the flail is laid aside, and bands are made for tying up the straw. Two of these are placed against the mowstead or barn *Lift* (a broad moveable pannel which drops into grooves at the bottom of the door-posts): and upon them armfuls of the straw are laid, and when the truss is large enough, it is bound. The *grips* or armfuls of straw are made against the knees, and well shaken as they are made,

keeping the straw even and regular. A bundle of straw has one band, a truss is bound with two; and when the latter is made up for sale, it should weigh forty lbs. Straw neatly trussed, combed out at the ends, and firmly bound, occupies less space in the straw-house, or the cart or wagon, and always fetches a better price at market. Wheat straw, when wanted for litter or for thatching at home, is only bound in bundles.

When the straw is all bound and removed to the straw-house, the broken straw and loose ears are raked into a ridge in the middle of the floor, and thrashed three or four times backwards and forwards, until every grain is got out; the *shack*, that is the broken straw, is next raked off, and thrown into the yard for the poultry and pigs.

The next thing performed by the barn-man, is to sweep all the corn and chaff from the sides into the middle of the floor; and with his rake, shovel, and broom, get the whole in a heap at one end. If *Fanners* be used, this machine separates the chaff from the grain very effectually; but this may be equally well done, by

throwing from the heap to the other end of the floor with the shovel. If a current of air set through the barn, the corn is thrown against the current; but this circumstance is not absolutely necessary, because the work may be done in a perfect calm. There is some art in throwing, so as to give the half-filled shovel the proper projection; the grain flies farthest, and is found free from chaff and every lighter substance. The chaff being all behind, and apart from the wheat, is immediately carried away in the *knee-fan* to the chaff-house; and by the help of a light elastic birch-besom, the *tailings* are got together, and fanned or sifted, or both, to separate the clean wheat from the lighter refuse, which last is laid to be again thrashed the next day. The clean wheat is next measured up, and another lot of sheaves laid down for the labour of the following day.

When as many days' work has been finished as will make up the quantity intended to be carried at once to market, the whole must be re-cleaned in the following manner. The whole is turned out of the sacks in a heap at one end

of the clean-swept floor, and thrown to the other: this frees it from any dust or piles of chaff which it may contain; and when this dust, &c. is swept to one corner, and the good wheat shovelled together in a heap, it is next put over the skreen.

A corn skreen is a frame of wood, about five or six feet in length, and about two and a half feet wide, resembling those used by builders for preparing their mortar; only, that for corn has a hopper-like head to receive the grain put up by the shovel. To regulate the issue of the grain from the hopper, there is a moveable slip regulated by a screw, to admit the escape of the corn in greater or lesser quantity, so as it may flow equally over the inclined surface of the skreen. The bed of the latter is composed of fine wire stretched longitudinally, so close, as to prevent the falling through of fair-sized wheat or barley, but allowing all dust, small seeds of weeds, and shrivelled grains to pass.

When the skreen is used, it is raised on the hinged prop behind, which propping part is covered with a sack; and the bottom of the

skreen is set upon the back part of the knee-fan, which receives the wheat as it trundles down the skreen, and out of which it is measured, sacked, and tied up ready for market. In measuring wheat or other grain, it is put gently off the shovel into the bushel, somewhat heaped, and struck evenly off, either with a round or flat *strike*. The sacks should be turned, brushed, and thoroughly dried before they are used.

When the wheat is all put through the skreen, what remains scattered about the floor is perfectly cleaned by the fan and wire sieve, and measured up with the rest.

When two taskers are employed in thrashing wheat, they take opposite sides of the floor; and in cleaning up, two hands do the work much more expeditiously; as while one is skreening, the other is measuring up. Indeed, in all barn-work, two flails, particularly in thrashing barley, oats, or peas, do the business better for the master, and easier to the workmen, than when one only is employed.

Besides the barn tackle already mentioned, barn clothes are particularly necessary; one is

made to fit the barn door, to hang from the middle bar to the floor, to prevent the grain flying over the lift. Two others should be made to reach from one side of the mowstead to the other, to prevent the corn flying over when the mow is empty, or when filled with another kind than that on the floor.

Barley Thrashing.—There is no other produce of a farm which requires so much care in preparing for sale, so as to command the best price, as barley; and if any one require an entire barn for itself, it is this. The least intermixture of other corn, depreciates the sample greatly in the estimation of the malster; and therefore barley should always be housed alone. Nor does any of our grain need half so much care in making up for market. Barley should be *fair*, not pale-coloured; it should appear as if shrunk in bulk, leaving the chaff or husk wrinkled—the form round, rather than lank in shape, and all of a similar size, orwhat is technically called an *equal* sample. When these properties are combined, the weight will very nearly approach that of wheat.

To obtain an equal sample, depends much on its simultaneous germination when sown, its colour on favourable weather in harvesting, and its weight on the suitableness of the soil on which it is grown. Its value in market, however, depends greatly upon the care bestowed, and manner in which it is cleared.

The mows are cut perpendicularly, like those of wheat; the tasker begins his operation by getting down a *flooring*, which is shaken loosely up along one side of the floor, and occupies nearly one half of its width. Beginning at one end, the thrasher, by repeated oblique blows of his flail, separates a wad of the barley to be thrashed; working at this by striking it right and left till the grain is off, when he whisks the straw to the vacant side of the floor. He then separates another wadd, which he belabours in like manner, progressively forwards and backwards from end to end of the floor, till the whole flooring is thrashed. The straw, after being shook up with the fork, is bound in bundles, and carried to the straw-house or to the cattle cribs.

There is an art in thrashing barley and oats, which can only be acquired by long practice. It is but seldom you see a clever tasker strike downrightly, but almost always obliquely, in a sweeping manner; and by a peculiar movement of the flail he jerks the wadd up in the air, and while falling, gives it a slashing cut, which separates the grain from the straw much more readily than if the wad laid close on the floor. This act of striking when the wad is off the floor, is particularly observable when two men are thrashing barley together; and is most effectual not only for dislodging the grain, but for breaking off the awns, which is a desirable effect. Indeed, neither oats nor barley can lie *too hollow* when struck by the flail.

When as much barley is thrashed as requires cleaning up, it is spread on the floor and freed from broken straw, weeds, &c. by the barn rake, having a short handle and head, with five or six wooden teeth standing wide apart. The rake draws all it collects into a ridge along the middle of the floor. This ridge is next sifted through a *caving* sieve, which allowing the barley

to pass, keeps back the coarser matters; then through a barley *ridder*, which frees it from awns, broken ears, clover leaves, &c., which passed the caving sieve. The next operation is laying the barley in a thick bed and *champing* it with an iron instrument, made of thin slips of that metal fixed in a square frame of the same, exactly like a gridiron, and attached to an upright handle. With this the barley is champed to break off the awns still remaining, preparatory to *throwing* and *skreening* to be measured and sacked, which is done in the same way as described for wheat.

Skreening is particularly necessary for barley, as the smaller and inferior grains are mostly voided; and especially the seeds of weeds, which are apt to infest barley crops. Charlock and cockle are frequent; and to get rid of the latter, wire sieves are made for this special purpose, having the wires set wider apart than the common wire sieves used by farmers.

Without all this labour in cleaning barley, it is impossible to have a superior sample at market; and though there is a good deal of offal, it does very well for pigs or poultry.

Oat-thrashing is executed much in the manner of barley, and is cleaned in the same way, except skreening; which process, from the make of the skreen, does not answer for oats: in lieu thereof the fan is principally used to separate the chaff from the corn.

The fan is a large triangular piece of wicker work, of a scoope-like shape, with the edges turned up. The hinder part is highest and bent over inwards; the sides gradually lower to the front edge. In the upper edge of the hind part or back of the fan, two strong wooden loop-handles are fixed, by which it is held when worked—the back being borne against the knees of the workmen, and, lest it should wear his clothes, is usually covered with lamb-skins; the wool outwards.

In using the knee-fan some dexterity is necessary, as both hands and knees are employed at once or alternately to jerk the corn above the fan and catch it again, while the chaff flies out to a considerable distance. The bushel is filled from the fan; the whole bulk being submitted to its test before going into sacks.

Thrashing Peas.—Peas are mowed in the barn like other unbound corn, floored, and thrashed wadd after wadd, much like barley or oats. They are cleaned for market like wheat—that is, thrown from one end of the thrashing floor to the other to free them from dust, skreened and measured up.

Beans are thrashed sheaf after sheaf, thrown and fanned, and measured into sacks. Beans as well as wheat require heavier swingles, and more downright blows than unbound corn Tares are similarly thrashed and cleaned. The straw of peas, beans, and tares, if they have been taken up dry, are all excellent fodder for one kind of cattle or other, either given whole or cut into chaff; or if very inferior and useless as fodder, they do for litter to increase the dung heap.

Thrashing clover seed is a tedious process, from the difficulty of dislodging those small seeds from the soft hose. Under the first application of the flail, the heads and withered leaves are separated from the stalks, the latter being got rid off as fast as they are stripped. The heads are then in moderate portions spread in a ridge

along the middle of the floor, and repeatedly thrashed backwards and forwards, by light and quick strokes of the flail, until by examination it is found that the major part of the seeds are out. This small seed is separated from the chaff by very fine cane, or brass wire sieves; and after it has been got into a marketable condition, it is questionable whether it will ever pay the cost of growing.

Growing turnip seed is a safer speculation, because it is always a marketable commodity. Swedish turnips should always be transplanted, because this variety is very apt to sport; and as the true sort may be known by their shape, it is prudent to transplant them, or at least to draw-out the mongrels from the true. Another test is, by examining the stock while in flower; the true Swedes have pale *purplish yellow* blossoms, while those of the mongrel long-stalked rogues, and all other varieties, have bright or *pure yellow* blossoms; these last should therefore be rejected if pure seed is wished. Turnip seed is most conveniently thrashed in the field on large cloths; because the pods are so brittle that half the seed is lost if loaded on any carriage.

Another way is, to employ a number of hands to carry the seed on hurdles to a barn, where two men thrash it as fast as it is carried in to them. This, however, is a summer affair.

I have detailed the various operations of the tasker as employed in the south of England, and on farms where neither *fanners* nor thrashing mills are used. I have dwelt, perhaps, too minutely on these ordinary matters, and which every agricultural labourer is acquainted with; but it is well that every young farmer should know how to direct his labourers, or at least to know what they are about, especially in the barn.

The next object of importance which demands the attention of the agriculturist during winter, is fattening a few oxen. The circumstances which should guide the farmer in this affair, are, in the first place, convenience so to do, by possessing appropriate buildings; plenty of good hay, turnips, and a purse, to enable him to purchase a few thousands of oil-cakes. According to his means, he may purchase a few Herefords, Devons, Short-horns, or fresh Welsh or Scots cattle in the autumn, either by attending the western fairs himself, or by

commission to a dealer of credit and experience. Much depends on the proper breed being chosen as well as on the individual characters of each beast. If the pasturage they are put on before being tied up—the hay they are to be fed with—and the Swedish turnips intended for them, be all excellent in kind, then a large breed may be chosen; but if these articles be limited in quantity and are inferior in quality, then smaller animals should be preferred. It must be confessed, however, that beasts fed entirely on artificial food seldom yield much profit; and stall-feeding cannot be recommended as a source of certain profit except as a principal means of making a great quantity of excellent manure.

There are few situations which do not afford room for half a dozen oxen to be tied up in a plain way. For regularly-built feeding houses are expensive erections; and some of them are uselessly convenient. A rack and manger for each beast, and a passage behind their heads for the feeder to attend them, is indispensable. This is true economy; as each kind of food can be so regularly and easily dealt out, and without

harassing the cattle by going among them. Regularity as to times and quantities is particularly necessary: a "feast and a fast" does not do. A variety of food is better than all of the same kind. Moderate quantities of hay twice or thrice a day, sliced turnips twice, and oil-cake chopped into inch-square pieces, morning and evening, with water at will, is a plan of feeding which will improve the cattle rapidly. They should be kept well littered, for the sake of adding to the dungheap: and even *currying* is considered necessary.

Fattening cattle on sugar has been tried; and I once superintended the feeding a lot of seventeen Pembrokes on hay and molasses only. A gallon of molasses was dissolved in ten or twelve gallons of water, and which they had constantly to drink. Their hay, of the best meadow quality, was also copiously sprinkled with a richer solution of the treacle, and of which they ate greedily: indeed of both hay and sugared water they were excessively fond. The whole throve as well as any beasts could do: and I think they were ready for market in about six weeks. They

did not get excessively fat: they were not up long enough; but they were prime in quality, and of the richest flavoured beef. Not having my book to refer to, cannot say precisely what they cost in, or what they fetched in market; but I very well remember the result of the experiment:—when the debit and credit sides were cast up there was only a balance of *four shillings and sixpence* in favour of the feeder. A very accurate account was kept of everything consumed, together with all charges of first cost, and sale: the value of the dress they made was set against the wages of the keeper: and everything for and against was fairly stated, in order to come to a fair conclusion—which was, that though cattle might be fattened on the coarsest molasses and hay, there was no great profit accruing therefrom.

It sometimes happens that a farmer who may have no design of buying in fresh conditioned oxen to fatten off, may have a pair from his own team, or a barren cow or two to tie up, to come in for market at the back of Christmas. This is often better than selling them lean at a low price.

But if no stall feeding be intended, buying in half a dozen Scots or Welsh runts to have the run of the straw-yard is the least, and as safe an adventure as a farmer can have recourse to; because they are sure to grow into money, and make a good deal of dress besides; and which is the grand object of keeping live stock.

The autumn and winter is the chief season for feeding pig-stock. Every farmer keeps at least one breeding sow for supplying pork and bacon for the use of the farm-house. It is questionable, however, where there is no pannage or dairying, whether buying in porkers and baconers to fatten, is not a cheaper plan than to breed them. Hogs are sad plagues in the summer season, if not always shut in the yard; and then it is only good fastenings and constant care that will keep them at home.

The pork season begins about Michaelmas; and therefore a few are put up before that time, and at stated intervals throughout the winter, according as they may be wanted for the family or for market. The best pork is fed on barley meal and skimmilk, if there be any, added to the

wash from the kitchen. Baconers are put up a month or two previous to their being slaughtered, which should always be before the warm weather or spring sets in. They are fattened by giving them peas or beans for a week or two at first, and finished off with barley meal. Were it not that inferior corn answers for feeding pigs, but little profit would accrue to the owner where there is neither pannage nor dairying. The run of beech or oak woods, is a vast assistance to pig stock; because for a month or two the animals range in the open air—feed in their own natural way, and become half fat before they are put in the styes. It is remarkable, that in ancient times the value of noblemen's and gentlemen's estates was estimated according to the number of hogs they could maintain. Then, indeed, the face of the country was covered with native woods; but since these have been cleared away, there are but few woods remaining in which the tenants are allowed the right of pannage.

Both male and female pigs intended for *stores* are gelded: the former when young, the latter when three quarters old.

Poultry is not an object of any importance to the British farmer; a few common poultry, to pick up the scattered grain and the seeds of weeds in the yard, and for the use of the family; or a large number of hens kept for their *eggs only*, will cause no loss: but rearing chickens for market is a bad speculation. A few ducks, for their eggs, if there be water at hand, and half a dozen geese bought in for stubbling, is all very well: but a general system of rearing and fattening poultry (turkeys included) for market, seldom answers the purpose of a main-chance farmer. I have seen rabbits kept on a most extensive scale—buildings erected for the purpose, and the utmost care bestowed in their management; and after being assiduously prosecuted for several years, at last abandoned as an unprofitable business. In all these minor affairs, by which a grain grower may fancy he can augment his income, by so disposing of a part of his produce, will find himself mistaken, as soon as he must go to the granary for supplies.

FARM HORSES.

Although the old custom of ploughing with oxen is still continued in some hilly countries; and though the custom is strongly recommended to be continued everywhere on the principle of economy, horses are universally preferred, not only for their more speedy action and tractableness, but because, in fact, there is no great saving in keeping a team of oxen. It is quite true that oxen may be worked for two or three years, and afterward fattened for the butcher; and, it is said, fatten better for having been worked; but their usefulness while in harness is not to be compared with that of horses, though these when past work are only fit for the dog-kennel.

It is a very general remark, however, that farmers for the most part, are extravagant in keeping much finer, and more valuable teams of horses than they need to do; and which on this very account are less useful than horses of an inferior description. Very fine horses must not be overworked, nor be longer at a yoking than eight hours at a time, or in a day! They must

not be kept out in rain, lest they take cold!—while horses of less value are driven about at all times and in all weathers; and, in fact, are really more serviceable than the others. Most farmers are also fond of large horses; which is another instance of vain extravagance; as it is well known that a compact, middle-sized, and hardy breed, is fitter for every purpose of a farmer than the larger breeds of cart horses. The size and strength of horses should certainly, however, be adapted to the nature of the land they work upon. Light loams and gravels may be cultivated by light teams; and heavy clayey soils by heavier cattle. In general, too, we see the strength of horses uselessly expended in the ordinary processes of ploughing. It is not unusual to see four, five, or even six horses yoked to a heavy plough, which with a lighter plough may be as well done by two, or, at most, three horses properly yoked thereto. In this particular many are led by what used to be the fashion. I know a rather elderly farmer who farms the same land his grandfather did fourscore years back. His grandfather never

ploughed with less than six horses; his father reduced his team to four; he himself uses only three; and he firmly believes his son will in future have no more than a pair of horses to do the same labour which his grandfather thought could not be done with less than six! The soil is a deep loam, in which there are neither stones nor clay; and near the centre of the county of Middlesex.

This improvement in the style, and diminished power employed in ploughing the soil, is the result of the application of mechanical dexterity in forming the ploughs; and also in the improved system of cropping by the introduction of green crops. The cultivated surface is so frequently stirred, that it never becomes so compact as to require powerful implements and great horse-power, except only in places where gravelly clay forms the staple. Here a pair of horses and a swing plough could do nothing; but when once broken up, the heavy plough may be laid aside; as its farther use is only a waste of power.

It is usual to call four horses a team; and a team is thought necessary for every one hundred

acres of land. There is always, however, an excess of power in favour of the large farmer; because four teams are sufficient for five hundred acres. But it is always better to have an excess of power than not enough; an *odd horse* is one of the most useful servants about a farm.

Farm stables are seldom divided into stalls for every horse; a team, whether of three or four, generally stand together, for the convenience of feeding as well as of cleaning the stable. But some horses are naturally vicious, and require to be stalled; and indeed it is the safest way to have all in single stalls if there be room for the feeder to pass close to the manger. Every stable has a lock-up corn bin; indeed every team should have a lock-up bin; otherwise, the horses will not be fairly fed. Every horse is commonly allowed at least one bushel of oats per week, and chaff without limit. A chaff-house is attached to every stable, into which all the chaff from the barns is daily carried in the thrashing season; and when this supply ceases, it is the ploughman's business to cut chaff for his horses on afternoons.

Farm horses should be well attended; the ploughman and boy, if he has one, should be in the stable as early as four o'clock in the morning; the first thing is to clear the racks and manger and begin feeding by giving moderate quantities of chaff sprinkled with oats in a server to every two horses; and this repeated for an hour at least. While the horses are feeding, they are curried and cleaned; and about half past five o'clock they are watered, harnessed, and if done their manger meat, have a little hay put into the rack to eat while the men have breakfast. At six they go afield and continue at work till two o'clock in the afternoon. If at plough, the team performs one acre during the eight hours; but at whatever work they may be employed, the horses, except for some urgent cause, are always shut off at two o'clock. At that hour they are brought into the stable—unharnessed, and have a little hay given in the rack to eat while the men get their dinner. The horses are then fed with chaff and oats as in the morning; and while feeding, are cleaned, watered, and well littered, and left at about half past four

o'clock with a little more hay in the rack, till eight, when they are *racked-up* for the night.

After the horses are fed in the afternoon the ploughman must see whether any assistance is wanted from the blacksmith, wheeler, or collar-maker, and get that business done in the evening. Shoeing or plough-share pointing is frequently required: and these things it is the ploughman's duty to attend to.

The harness, both for plough and cart, is usually, and indeed always should be, hung against the wall behind each horse, either upon single or double tucks. So that the collars, bit-halters, hames, and traces may not get intermixed. Plough traces are either chains or hempen; the latter always attached to the hames, the former remain on the whipping-trees, and are hooked to the hames at yoking.

This is the usual stable management pursued among the generality of farmers in the south of England. In Norfolk and other places, the day's work of a team is performed at twice; namely, out at six in the morning, and shut out at eleven to feed and dine; out again at two o'clock,

and work till four or five. This is supposed to be easier for both horses and men; but there is very little more labour done, much time being lost going out and in.

As soon as vetches are fit to cut, about the middle of May, the horses are entirely fed with them; the corn and hay being gradually withheld. They are cut and got up hy the ploughman on afternoons; and generally last till the hay is off the meadow ground, when the horses lie out on nights; being turned out as soon as fed, cleaned, and watered, after the day's work is over.

In hay-time and harvest this regularity of feeding and working the team cannot be observed; but in those seasons it is generally at plough before breakfast time.

Farm horses are differently fed by some farmers; giving no food in the rack, which they consider as wasteful, but all manger meat. The hay is cut into chaff, and instead of oats or split beans, they mix certain proportions of sliced carrots or Swedish turnips, on which the horses do very well. But this is by no means a com-

mon practice; and yet it is sufficiently obvious, that prepared manger food goes much farther, and of course is more economical than any kind of rack-meat, except tares and the like. In some countries the horses are always racked up with some kind of straw instead of hay.

Some farmers make a good deal of money by dealing in horses. They buy young likely-looking cart colts or fillies, break them in at plough and cart, thus making them earn their keep; at the end of two years these are sold out at a good profit, and succeeded by others bought in the year before. Thus the farmer is never burdened by old unsaleable horses, (except, perhaps, one or two favourites) and only considers his horses as a part of his breeding or fattening stock. He must, however, be a good judge of horses who adopts the plan; as otherwise there may be more loss than gain by it. Where circumstances allow, a farmer may keep a breeding mare or two; the foals soon grow into money.

Fences.—No farm can be well managed unless it be properly subdivided by effective fences. Whitethorn fences are by far the most suitable

of all others; and when hedges are to be planted, no other plant should be chosen. It often happens, as it has happened to myself, that farmers often take to farms already fenced, and they have nothing to do but to manage them properly. Hedges should always be kept low and thick at bottom; but if this have not been previously done, and allowed to grow wild and lofty, the best way is to have them re-made, by laying them down in the ordinary way, and afterwards keeping them low with the pruning hook. In some countries the hedges are allowed to grow high, and are re-made or laid down every seven or eight years; the extra stuff afforded by them being trusted to for supplying the house wish fagots for brewing and baking, and the farm with hurdle poles and fencing stuff. In such districts, low hedges, though suitable for the growth of corn, are not so for the custom of the country; but it is very certain that such high hedges weaken or destroy more corn than all the fagots and fencing stuff th ey yield is worth. And, besides, they generally occupy very wide brows, which diminish the arable surface of

every field, and harbour many corn-eating birds, and are every way unprofitable. The hedge occupying three feet of ground, with a shallow ditch or hollow on one or both sides, and four feet high from the root to the top of the stems, is fence enough for any kind of live stock, provided the stems are sufficiently strong to resist browsing cattle. This kept down to the requisite height by the pruning hook or shears, makes a neat and effective fence between fields. Outside hedges, such as are against public roads, should have deep and wider ditches to prevent the browsing of road cattle.

CALENDARIAL MEMORANDA.

The foregoing remarks and observations are related nearly in the order in which the operations were performed, and therefore in some measure answer the purpose of a calendar. But calendarial directions are of but little use in this uncertain climate, as it happens but seldom that two consecutive seasons are exactly alike. However, as a farmer's calendar occupies but little space, a brief one may be added.

January.—Sow peas and beans. Plough for oats. Stir fallows if the ground be dry. Continue thrashing out corn and feeding pigs; attend to the cattle in the yards and stalls; the sheep on turnip and pastures, and the milch cows and calves, whether sucklers or weaners. Carry out dress in frosty weather; and collect marl, chalk, and lime, to be mixed with dung to form composts for top-dressing. House the flock in cold, wet, or snowy weather; castrate and dock the forward lambs from time to time as they get ready, and keep them on a dry warm lair after the operation.

February.—Finish and attend to everything advised to be done in January. Sow oats, and stirrey the ground cleared of turnips intended for barley, if the ground be sufficiently dry. House corn stacks, if there be barn room, and if a fine day invites. In doing this the barn cloths will be wanted under the stack, and upon the hind ladder of the carts or wagons. Throw up as much dung in the yard as may be wanted for a piece of spring tares; and if the

winter tares are not too far advanced, and if the surface be dry, they may now be rolled in order that they may be the easier mowed.

March.—This is a busy month ; sow oats and barley ; peas may yet be sown if not previously done ; sow spring tares ; plough fallows, and prepare a piece by deep ploughing and dunging for potatoes, if intended to be planted. Prepare also the ground for Swedish turnips, mangel wurzel, and drum-head cabbage, by getting the dress on in time. Bush-harrow, roll, and shut up meadow ground or pastures intended to be mowed. Remove sheep from off sainfoin and clover preparatory to rolling and shutting up.

April.—The business of last month is continued throughout this, so that all shall be over before May-day. Beans and peas if drilled may now be hand or horse-hoed. If grass seeds are to be sown on young wheat it may be done after being harrowed, finishing by rolling smoothly. Wheat may also be top-dressed if not done in March. And if the wheat plants look lean and unthrifty at this season, it may be much assisted by receiving a good harrowing, and

afterwards rolled. The last and principal roots of the wheat are put forth at or a little before this time, so that either harrowing or top-dressing is peculiarly serviceable in strengthening and encouraging the tillering of the plants. Weeding this crop may also be begun; docks should be drawn; thistles, cockle, and poppies should be spudded. This month is sometimes a trying season for live stock, particularly sheep, especially if the couples and the wethers, intended to have been fattened on turnips, have not been before got ready for market. When turnips are gone and no grass forward enough, both sheep and lambs go back if some substitute of trough-meat be not provided. A few of the couples, a very few, may be turned over the young advancing clover, or forwardest meadows. But as the young grasses are extremely succulent and washy, the couples should still be treated with trough-meat occasionally to keep them on.

May.—This is the most cheering month of the whole year to the farmer; his crops are all progressing; and their youthful vigour and fresh-looking foliage are to his hopes an earnest

of an abundant harvest. Every care is therefore taken that the fences are all efficient; and that they are all carefully weeded. Swedes and mangel may be sown on or even before the beginning of the month, especially if wished to be as large as possible. Potatoes and cabbages should be planted a fortnight earlier. Every exertion should now be made to get the rest of the fallow intended for white turnips into a state of forwardness, so that the sowing may be all over before hay-time. Getting in the turnip seed, preparing, cleaning and dunging the land, occupies much time of both men and teams, and in the execution of which, the greatest part of this and the following month is usually consumed. But if finished before hay-time, the farmer may feel himself very fortunate. Throw up dung in the yards to heat.

June.—Turnip hoeing begins, and the same implement is required among other crops. If the fly have ravaged the first sowings of whites, the business of re-sowing must be instantly executed; and it will be lucky if the second sowing stands. Mowing begins about the middle of

the month. This employs all hands; the teams being engaged in the turnip fields or on wheat fallows every morning before breakfast. At this time the horses are chiefly fed on winter tares, and which, if mixed with a little rye, are ready for the scythe about the first or second week of the last month. Hoeing turnips is usually performed by the acre; charge, six shillings per acre; and if gone over a second time, two shillings more. If the plants have risen too thickly, giving a tine, or a 'bout with the harrows, renders hoeing easier and more effectual. Washing and sheering the sheep is commonly done during the mouth; and should be done, if possible, before haytime, especially if the weather be warm.

July.—The turnip fields still require attention: if the first sowings have been successful, setting the plants out thinly, should now be done; and if any have missed, the ground must be re-ploughed and re-sown. Harvest begins in this month with the reaping of rye, or of picking peas. Reaping wheat succeeds, varying according to the season between the twentieth of this

month and the tenth of the next in the south of England. It must not be forgotten that the sooner wheat harvest is over the better: and to secure this important object, an efficient band of reapers should be previously engaged; and the terms on which the work is to be done fairly settled. Most farmers engage extra hands, whom they happen to know in the neighbouring villages; others trust to hiring travelling reapers; while the constant hands are variously and otherwise employed. The extra hands in some places are called *month's-men*, who receive a certain sum of money for the harvest, whether finished in three or in five weeks, namely, from three to four pounds and their board. The constant hands have commonly an extra guinea for the harvest month; and all have a liberal allowanee of beer during that busy time.

August.—This is entirely a harvest month: in which reaping or otherwise cutting wheat, mowing barley and oats, tending those crops in the field, and carrying them as soon as fit to the barns or rickyard, are all incessantly executed from daylight in the morning until night. The secur-

ing the crops is the chief business; but there are other matters which also should be thought of: the first is dunging a piece of the first cleared wheat stubble, for winter tares, and a sprinkling of rye. The quantity of seed and area of land so sown at this time, to be proportioned to the purpose for which the crop may be required next spring. Another adjoining portion may be sown next month. A large piece of wheat stubble should also be now prepared to be sown with stone turnip to take a chance of having a little spring keep on the fallow. To give this little turnip a fair trial, the ground must be well ploughed, and reduced to the utmost fineness by the harrows and roller before the seed is sown; and which, in kindly seasons, prove an useful addition to the main crop.

September.—Finishing harvest, thatching corn ricks; dunging wheat fallows; thrashing out or purchasing seed wheat; sowing another piece of winter tares mixed with rye, or a piece of rye alone, if wanted; mowing and getting up the second crop of clover, are all the ordinary occu-

pations of this month. Toward the end, wheat sowing begins, and continues through the next month; first on the fallow, if any; next the clover leys; and at last the bean stubbles; giving the sheep the previous run.

October.—Wheat sowing continued: beans cut and carry; take up potatoes; strip the leaves of mangel wurzel; buy in live stock; tye up bullocks and barren cows; remove sheep from damp pastures, or if on, give salt in troughs occasionally. Farm servants are usually hired in this month; and preparations made for crib and stall feeding of every description of live stock.

November.—Plough up vacant stubbles; pull and store mangel, potatoes, or other roots destructible by frost; keep the forward ewes on dry pastures, and look to the regular foddering of cattle in yards and folds.

December.—Care of live stock; collecting all sorts of enriching, exciting, and decomposible matter to form mixens are seasonable labours; draw chalk either from open, or from underground strata, to lay on light, gravelly, or on any land

liable to burn in summer; towards the end, if the weather and surface of the land be dry, the harrows may be put upon the bean land to lay it in order for drilling.

I have already observed that calendarial memoranda are very seldom useful to farmers; chiefly because our seasons are so variable. For however a well planned train of operations may be laid down, a change of weather may arrest proceedings at the very first step. For instance, a protracted winter may delay the business of January and February, till March and April; and hence the whole concatenation of summer operations are retarded; and consequently, as it sometimes happens, turnip-sowing, hay-time, and harvest must all be carried on together.

This is not only a loss of time, but often a loss of crops. A loss of season is always a misfortune: the most important operations are often in the hurry imperfectly performed, and some necessary labours are altogether omitted. And yet no vigilance nor extra exertion can operate as a remedy: nor can the derangement be overcome until a more genial season come round. It

is always observed, that if a preceding crop be inferior, either from loss of season or mismanagement, the succeeding one almost always partakes of the inferiority. These failures from adverse seasons are heavy drawbacks on the business; but it is what every farmer must expect to encounter, and frequently too, in the course of his life or lease, and which, however, ought always to be allowed for in calculating the probable returns of every farm.

Some districts are much less affected by changes of weather than others. Where the staple is a light sandy loam, reposing on gravel, rain (however long it continues to fall) is quickly absorbed, never resting on the surface, and therefore may be worked at any time, except only when rain is actually falling. Farms of such a description are the most pleasant of all to occupy; because, though the crops (except turnips) are never remarkably abundant, yet the produce is good in quality, and the expense of cultivation is moderate, compared with the expense of a heavy-land farm.

Heavy loams, clayey, or alluvial soils, are

rendered unworkable by melted snow or much rain. The water rests upon or near the surface; and while in such a saturated state it cannot be even trodden upon. To counterbalance this waste of time in waiting till the surface is dry enough; if at last a good time is seized to sow such land, the produce is exceedingly abundant, both in straw and grain. So that both descriptions of farms have advantages as well as disadvantages.

There are but few farms which have every field of a uniform description of soil. Some are lighter or heavier, richer or poorer than others; and it is a lucky circumstance when such is the case, as different plants require different soils; peas, beans, and wheat affect strong rich land; oats and barley that which is lighter, drier, and consequently warmer.

An excess of moisture on the surface of arable land, whether caused by its retentive nature, its situation, or its springiness, is most inimical to the purposes and success of the farmer: and if such land cannot be laid dry by draining, it can be of no value but to the planter. Grass land of

the same character is only fit for pasturage to dairy stock, and other cattle. But there are few such descriptions of land, nay even bogs, but may be reclaimed by judicious draining, or by proper management and disposition of the surface by the plough.

OF THE DIFFERENT OPERATIONS AND IMPLEMENTS OF FARMING.

Ploughing, and the machine with which it is performed, is one of the most important tacts and useful articles appertaining to the practice of husbandry. Ploughing is necessary wherever corn is cultivated, in order to clear and loosen the surface. Whatever the land has previously borne, there must be some remains of the former herbage, whatever that may be. This (in the action of loosening the soil, which is the principal result) is necessary to be turned down, as well for the convenience of ulterior operations, as that it may rot in the soil and be changed into vegetable food, or at least tend to keep the staple more open.

Ploughing is only a species of digging: and the nearer the action of the plough can be made to operate like the spade, the more perfectly is the soil disturbed for the prosperity of the intended crop. Ploughs have been improved from the rudest and most cumbrous forms to those of the utmost neatness. They are formed on the nicest principles of mechanics, in order that they may detach, raise, and turn a furrow, with the least call for, or exertion of animal power. The best formed ploughs are those which go easiest after the horses, and at the same time do the work most perfectly. The set and form of the breast or mould board, is that part of the machine which requires most of the attention and mechanical skill of the plough-wright. Some are formed convex, having a sweep like a segment of a large circle: others are concave, contracted at bottom, and hanging over at top, particularly at the after part, or tail of the breast. But the most approved form of mould-board is that called the *twisted-breast,* formed of cast-iron.

The convex mould-board, in its action through the soil, only pushes aside that opposed to it; and

is particularly useful in working clear fallows, where no turning of the furrow-slice is required. This plough has also a peculiar rubbing or grinding action upon the clods which it moves, causing disintegration, and rendering the soil finer.

The concave breast raises the furrow-slice from its seat, gradually turns it completely over, and is most effective for burying a crop of weeds or stubble.

The twisted metal-board turns the slice *not* completely over, but laying one upon another, at an angle of about thirty degrees, thereby leaving a right angle of the slice to be acted on by the harrows. These ploughs are much admired by ploughmen; because they make, when properly held, remarkably neat and regular-looking work; particularly in ploughing leys, or in breaking up old sward. These ploughs clear the furrow completely, and the slice is sufficiently turned—the grass undermost; but the slice is so entire, that it is very little disturbed in its consistence, and remains as compact as it was before it was turned. This occasions a great

deal of harrowing, in order to raise loose mould enough to hale or cover the seed; so that the accurate performance of the plough is of no value to the crop.

An objection is made by some persons to the performance of these ploughs, when employed on clover leys infested with slugs. Every last turned slice leans upon the former one, leaving a small triangular hollow underneath; in this vacancy the slugs lie safely; live for a time upon the green herbage ploughed down with them, but at last rise to the surface to feed on the crop. From this they can only be debarred by much harrowing, to fill the seams between the furrows, and much rolling, pressing, or treading with sheep, to consolidate the staple to assist and preserve the plants.

Efficient ploughing is necessary in all cases; and a good deal depends upon the skill and care of the ploughman in laying his ridges high enough, but not too high in the middle, and lowering gradually all the way to the open or *hinting* furrow, taking care not to let the last be too high. Unless this form of the ridge be

given by the care of the ploughman, neither the harrows nor the roller can act properly; nor will the lands remain so dry as they should be, as irregular ploughing renders surface drainage incomplete.

The depth to which land should be ploughed depends much on the nature of the subsoil. Lands which have been long under the plough, have each a staple more or less in depth, and which, if possible, should be increased rather than diminished. Whatever the subsoil or *pan* may be, whether clay or gravel, a little brought up every year is judicious; and if friable loam, there is no fear of ploughing too deep at the commencement of a fallow. For ordinary crops on a well cultivated surface, five inches is the usual depth. The breadth of the ridges or lands depends upon the nature of the soil, as to its being more or less retentive of surface water. Eight step ridges if dry; four step ridges if inclined to hold moisture: and very tender soils require to be laid into four or only three, 'bout stitches. These last are drilled and harrowed by the horses walking in the furrows.

There are great varieties of ploughs invented for the different processes of husbandry. Trenching ploughs are used by planters, and market-gardeners. Common ploughs are of many different forms, either swing or mounted on one or two wheels. Wheels are invented for the ease of the ploughman, on soft land, where the plough is inclined to go too deep; and on land where the pan or subsoil is hard rocky gravel, where the plough must be teamed deeply to keep her under the surface, and borne up by wheels lest she should go too deep! Here is certainly an unnecessary waste of power; because two parts of the machine are set to counteract each other; the share is pointed to incline *below* the horizontal line, and the wheels are present to keep it from going too far below. Of course the share is worn most on the under side of the point, and though steeled on both that and the land side, they rarely last longer than one day in gravelly soils. It is the same with cast-iron points, if used instead of wrought-iron on such land; if they serve to plough two acres, it is as much as is expected. It is necessary,

however, that the point of the share should dip a little below the horizontal line of the sole, in order to enable the ploughman to alter the direction of the plough either into or out of the land.

The *land* is the unploughed part of the ridge; the ploughed part being called the *work*.

Light soils may be ploughed with any kind of common plough; but clayey land requires much more powerful and accurately finished machines. Where much power is required, the plough should not only be constructed to do the work as easily as possible, but the tackling or furniture of the plough to which the horses are yoked should be well designed, in order that there may be a *yielding* action to prevent fracture when the plough comes against a rag-stone or rock.

This play of the tackle is produced by the manner in which the whipple-trees are linked to the *way*, and the latter to the stock of the wheels, or to the *cock* of the beam; but which, like the proper use of the plough itself, cannot well be described in words. Local circum-

stances and experience have fixed the form as well as the size and weight of the ploughs; the nature of the soil and subsoil governing the plough-wright as well as the ploughman. In land where there are no stones, a plough may have a wooden *sole* of considerable breadth on which the *sock* or share is fixed; but on stony land, having a firm pan, such a plough could not be kept in the ground but with the greatest difficulty; and therefore a suitable skeleton plough is found the most convenient: that is, supported on two *rises* of wrought-iron, the share tail being one, and the other under and ranging with the mould-board. The former being nearly three feet in length, keeps the plough perfectly steady in a direct line; and the latter cuts up the root weeds, and clears out the furrow thoroughly.

These ploughs are only adapted for stony land; but, what with their apparatus of wheel-carriage, chains, &c. they are most cumbrous and expensive implements: they lie *too far* behind the horses; and this, together with their weight, occasions a great waste of animal power.

Subsoil ploughs have been lately invented. Their professed use is, to break up and loosen the subsoil without bringing it to the surface. This is a desirable result, because it deepens the staple without burying or deteriorating the ameliorated surface. This may be serviceable on every kind of land; but particularly so on clayey fields after they have been underground drained. As the drains are always carried in the same direction, or obliquely so, with the ridges, it may easily be conceived that the subsoil of the intermediate spaces between the drains remains as firm as before the drains were made; and that surface water can only flow towards the drains over this firm substratum. Now, if a field so drained be afterward subsoil ploughed across the drains, a larger depth of staple is not only thereby gained, but cross openings or ducts are formed to allow water to percolate through the disturbed subsoil, and consequently pass imperceptibly away at a greater distance from the seats of the plants or seeds. In such cases, the effect of the subsoil plough on tender soils is invaluable; and if

repeated every seventh or eigth year, a fine workable dry surface may be maintained and fitted for every purpose of cultivation.

The subsoil plough acts somewhat on the same principle as the *mole* plough, only the first is adapted for arable land, and the latter for damp meadows. The latter consists of a cylinder of cast-iron, of about four inches diameter, and two feet long, fixed by two thin, but strong wrought-iron ledges to the beam, which is mounted with handles and a cock by which it is drawn: the mole is twenty inches below the beam. A hole is digged to admit the mole at the end of the work, and then drawn in the direction required. The foremost tuck or ledge is sharp edged, and acts like a coulter cutting the turf, while the mole below leaves a round tunnel in the earth, which acts as a drain as long as it remains entire and unchoked. The effect of mole ploughing is only temporary; but it is by no means lost labour; as the quality of the grass is much improved.*

* Another mole plough has lately been used; it is on a similar construction, but after it has been let into the ground, it is drawn along by a chain and windlass, turned by horses.

Turn-wrist ploughs with double mould boards, which are moveable either to the right or left side of the line of draught, are used where no ridges or open furrows are required. The team begins at one side of the field, and ploughs forward and backward until the other side or end of the field is gained. These ploughs are useful in laying down dry ground into permanent pasture, for laying down lawns, or for casting all the surface up hill, or away from hedges and the like. They are, however, not in very general use.

Double furrow ploughs are used in some of the central parts of England; and in light friable loams expedite the business of stirring the surface. They are in fact two ploughs framed together, the one a little in advance of the other, and which last can be thrown out of the work at the pleasure of the ploughman; which is necesary in *hinting* a ridge, or in striking-up a furrow.

There are also on some farms double-breasted ploughs drawn by one horse, for stricking up furrows, to allow surface water to pass readily off. These are also used for earthing up drilled crops where the soil is sufficiently loose.

Drill ploughs have been constructed in many different forms; from the simple barrow machine which sows one drill at a time, up to the complicated machine which sows five acres per day. Some of them are made to distribute lime, bone, or other dust manures, along with the seed, which is a great advantage as affecting and exciting the plants in the first stage of their existence, in laying the manure exactly in the place where it is chiefly wanted, and making moderate quantities go a great way over the land. Drill husbandry is one of our greatest modern improvements; and when it is followed up by the drill plough or hand hoe in extirpating weeds, the advantages are many and manifest.

Of the Harrow.—This implement is equally necessary for the proper execution of the culture and pulverization of the soil, as is the plough itself. The operation of the latter would be of little avail without the comminuting action of the former; and it is commonly said that for small seeds it is impossible to harrow too much. Levelling and smoothing the surface are not the principal effects of the harrow; loosening the surface which has been left too compact by

the plough, for the reception and burying the seed, is the chief use: and if this be done imperfectly, the equal germination and progress of the plants are defective. There are one or two exceptions, however, to this rule, namely, when peas or beans are sown broad-cast, harrowing twice in a place is enough; for if harrowed much more, the seed is liable to be brought to the surface. But for smaller seeds there is no fear of this happening.

The common forms of harrows are four-feet square frames, consisting of four beams as they are called, united by as many ledges morticed through the whole. The beams are about one foot apart, and hold five or six wrought-iron tines, forged to an inch square, but tapering to a blunt point. The tines have flattened heads, with a perforated ear on one side, by which they are nailed to the beam above. Each harrow has a chain *tailwith* and whipple-tree, to which the traces are attached when at work. The tailwith is joined to one angle of the harrow by a copse and iron pin: and in which diagonal position the harrow is drawn, in order that the tracks of

the tines may break every inch of the surface.

When two or more harrows are drawn together, they are kept so by what are called *couplings* at the sides; and when a team is yoked to the harrows, each off-horse is tied back by his *chap-rein* of the bit-halter to the trace of the near horse. By this manner of yoking, the horses do not walk in a line abreast; but each off-horse is at least one step behind his near leader.

When four harrows are worked together, their action is very satisfactory, especially in light friable soils; but when the surface is hard or tough, they make but a slight impression, unless they are heavily loaded with blocks of wood. It was this imperfect effect of the common harrows which caused the invention of drag-harrows, scarifiers, &c., so useful for breaking up stale furrows before sowing, and which often saves the expense of another ploughing.

Harrows are indispensable in working fallows; and when alternating with the roller, are effective for bringing weeds to the surface, to be

raked together and burnt, or carried off. In seed time they should always precede the sower; for unless the traces of the plough are obliterated, the seed can neither be regularly deposited over the surface nor laid in at an equal depth.

In light work, three harrows are sometimes drawn by two horses, or two by one. This is accomplished by having long *ways*, to which both horses and harrows are attached by proper tackling. When drawn over the land once, it is said to be *tined:* and if the harrows are brought back over the tined space, the land is said to be 'bouted, that is one *about*. So when the plough returns to the spot or end whence it set out, it is said to have gone one *about*.

Scufflers are a species of harrow having ducks' feet tines; they are useful for cutting off a weedy or stubble surface preparatory to getting land into a cleaner state for some following crop. In light land they answer the purpose of the plough, by clearing the surface of large weeds and stubble, which may be harrowed, collected, and cleared off; and this also brings up a birth of small weeds, which will be destroyed when the

ground is ploughed for the next crop. This tact of cultivation is only necessary on land which does not require exposure to the winter frost. Some of those scufflers, drags, or ribbing harrows are mounted with a pair of handles, and a beam for laying on a wheel carriage of a plough, in order to regulate the depth at which the tines are wished to go: and the handles or stilts enable the ploughman either to press the tines deeper into the soil, or lift the harrow entirely out of the ground, to free it from weeds or stubble which may accumulate round the tines.

Ribbing harrows have been constructed in the shape of an equilateral triangle, with a truck-wheel in the front angle, (to which angle the horses are also yoked) and with two stout cross beams behind, in which are nine strong tines—four in the foremost beam, and five in that behind. The tines *rake forward*, to get under and bring couch or other weeds to the surface; and having two handles to steady it in its work, is a useful implement in working fallows. Its only defect is its liability to be occasionally *choked*

with weeds, which causes a pause while it is lifted to be cleared.

A chief advantage possessed by such machines is, that they stir the surface, and clear it of weeds without turning it, as would be done by the plough; for the less light land is turned to be dried by the sun, the better it is for the succeeding crop.

The *coulter* is one of the members of a plough; it is placed nearly over the point of the share, but a little more into the land. Its use is to cut through turf or the tough or parched surface, in order that the share may raise and turn the furrow-slice neatly and properly. The slice is commonly about nine inches wide; but this is either more or less according as it is intended to be laid: if the slice be intended to be turned on its edge, it is narrow; but if to be whelmed completely, the slice of course must be wider than nine inches.

A very useful kind of coulter is called a *skim*. This has a direct cutting edge, and also a *wing* or *fin* on the off side, which cuts horizontally. At the hind part of this last, another wing is welded

to the stem which stands obliquely backward, answering the purpose of a little breast, which pushes whatever is severed by the horizontal wing into the furrow, to be covered by the slice which the plough is in the act of turning. This is a most covenient appendage to a plough, when whatever is on the surface, whether dung, weeds, or stubble, is wished to be completely buried: and many farmers use it in ploughing leys intended to be drilled.

Rollers are indispensable in farming. They are formed of either wood or cast-iron. Very heavy ones of the latter material are cast for rolling meadows or pastures, and solid wooden ones are employed on arable land.

The actions of this implement are manifold; it levels, consolidates, and reduces the uneven, the puffy, or the cloddy surface. It is absolutely necessary for all crops intended to be mown or bagged to be rolled: and it is as necessary that all soils, if made too light and porous by aration, should be made firm and compact, to insure a perfect rooting of the seedling plants. In the execution of this labour, however, care must be

taken that the soil be not in that state which farmers significantly call "*kneading*," or liable to "knead." This happens when the soil is too moist: and if consolidated in this condition, it is made *too close*, and impervious to air, which is always necessary to the roots of plants in order to their thriving.

Reducing or crushing every clod into powder is another effect of the roller, and is particularly necessary for small seeds—such as turnip, clover, and the like: and the preparation for the reception of such seed is greatly facilitated by following the harrows with the roller.

In working fallows, many roots of weeds are enclosed in clods of earth, and upon which the harrows make not the desired impression until after the roller has passed over them.

Spring rolling growing crops of wheat, tares, &c. is often of great service. If heavy rain have battered the surface into what afterwards becomes a hard crust, the action of both harrows and roller will be required to pulverize it. And on the contrary, if the surface lie rough, as it often does in spring, the roller reduces the clods into

fine mould, and earths up, as it were, the young plants much to their benefit at that season.

Wooden rollers only differ in diametric bulk, and are drawn by a pair of shafts mounted like those of a cart. The cylinder is from ten to eighteen inches diameter, and about eight and a half feet long, though the length depends upon the width of the farm gates, which are usually about nine feet between the posts. Very light rollers, as well as light wooden-tined harrows, are used for covering and rolling down grass seeds or turnips on very light land.

AGRICULTURAL STATISTICS.

It is a very interesting and very pertinent question for a young man to ask—what prospect he has of remuneration for his capital embarked, and for his time and labour bestowed in the business of farming? The answer cannot be readily given, because it depends on so many circumstances relative to soil and situation, condition of the land, and character of the farm, as to whether arable or grazing, or its proportions

of these two, together with the amount of rent, tithe, and poor-rate; all which must be ascertained and considered before even a probable idea can be formed of the returns. And besides, agriculture has suffered such wonderful fluctuations within the last thirty years, that every rule for calculation is now almost useless. Within that period farming has been at a high pitch of prosperity; and also in the lowest state of depression. The latter was a natural consequence of the former; for while the prices of every description of farm produce gave way, the farmer's expenses remained long after he had ceased to be able to pay them. And had it not been that the legislature interposed to stop the importation of foreign grain, both landlords and their tenants would have been driven to the greatest distress: and which would have caused such a rupture in national affairs, as would have shaken public credit to its very foundations.

At present, however, the crisis has passed over: but few of the ruined farmers remain out of their graves, the workhouses, or the wilds of foreign lands. Those who were able to get over

the time of the greatest depression, have rallied in some degree since, chiefly by accommodating themselves to the reverses in their business, by carrying it on less expensively, and by trusting more to live stock than formerly; the low price of corn inducing them to feed live stock with it, rather than sell it at a positive loss.

Even under this improved condition of British farmers, there is one thing which tends and must ever tend to deprive them of the due share of the profits of their business. It is this:—all those who manufacture or deal in farm produce, exact the same profit on its passing through their hands now, as they did when corn was double the price. Thus the miller, baker, malster, and brewer, all middle men, have their full share of profits, while the producer has scarcely any profit at all! There is no remedy for this.

With this view of the present state of farming, together with the dear-bought experience of times past, tenants are far more acute and cautious than they used to be; and as the operations of the corn-law have fixed a maximum limit, over which they cannot expect to go, or even ap-

proach, but for a very short period, they are now more careful in hiring farms. They are also much more aware of the advantages of live stock; by keeping of which they will be enabled to raise as much corn without the expense of so much ploughing.

The fluctuations above alluded to, have very much deranged the affairs of farmers as compared with other trades and occupations of the country. In former times it was always considered that whatever a farmer's rent was, *that* was also his income, or annnal return for his capital, skill, and labour. According to this principle he was rated to the poor, and to several other parochial and parliamentary taxes when called for. The whole value of his annual produce was supposed to be divided into three parts, viz.—one to the landlord; another to pay labour, tithe, and tradesmen's bills, and the last for himself. This old computation and allowed division of the produce, has long ceased to exist. The extension of agriculture, and the increased number of candidates for farms, together with the constantly increasing population, naturally enhanced the

demand for, and consequently the value of farm produce. These as naturally raised rents, tithes, and poor-rates. This last, however, became permanent, while the value of produce varied according to the abundance or scantiness of crops, and to changes in national circumstances.

The most momentous event which deranged the old uniform and steady character of farming, was the French revolutionary war. During this dreadful contest, such was the demand for every kind of farm produce, that the prices became enormously high; and of course raising the nominal value of every thing else which could be bought or sold. At the return of peace a sad reverse took place as respected farmers; corn became a drug in the market, and was with difficulty sold at any price; while, as already observed, most of the war burthens remained to be borne: nor has the derangement caused by that war yet ceased to operate.

These were the causes which have made agriculture a very different business to what it was formerly; and to be profitable in almost any

situation, a large capital, superior skill, and an untiring perseverance, are required.

The capital of a farmer is calculated by the number of acres which he has, or intends to hire. Ten pounds per acre may enable an industrious man to hold himself harmless; but he cannot expect to be a prosperous farmer, unless he can command a capital of fifteen pounds per acre. A farm of two hundred acres at thirty shillings per acre, amounts to £300 per annum, rent; this would require a capital of £3000. This sum, if employed in some trades, would probably return fifteen per cwt. or £450, from which, deducting the simple interest at 5 per cent. leaves £300. Supposing, then, the farmer produces to the value of four rents, namely £1200, one of which remains for himself, viz. £300, from which must be deducted interest, as above, it leaves only £150 profit for his time and labour. Even in this case he may think himself fortunate; but when, as it often happens, he has neither a rent for himself, nor a shilling of interest for his capital, and, moreover, is obliged to dispose of part of his stock to pay expenses, his situation is

not to be envied. And yet this is often the result of a want of capital, of low markets, or of ungenial seasons.

This is not a flattering view of the present state of British farming; but it is not far from the truth. A bustling industrious man may make a shift to live comfortably: but assuredly he will not get rich by the cultivation of the land. The mercantile and manufacturing interests of the kingdom imperiously demand the fostering care of government, and for their sakes a check must be imposed to prevent the necessaries of life reaching such a price, as that the operatives could not purchase them without higher wages than the masters could afford in order to meet the foreign manufactures in their own markets. In this matter, however, the manufacturers argue unreasonably; they claim a right to buy the principal necessary of life from foreigners, but forget that their own agricultural countryman are their best customers; and would be astounded and ruined, were the British peasantry inclined to wear nothing but the cheap fabrics of foreign looms; nor would there be

greater impropriety in the farmers of this country buying everything they need from foreigners, than it is for our manufacturers to insist on using only foreign corn. It is true that, from the excellence and durability of English manufactures, they will always command a preference at home as well as abroad; but between the home and foreign customers the former should surely be considered; more especially when it is well known that it is the *financial* exigences of the country which impose the corn laws.

In the present position of affairs, and under the working of the present corn laws, a farmer may easily perceive that corn can never again fetch a high price while it is cheap and plentiful on the continent; and therefore, if he think of hiring a farm, his calculations must be made accordingly.

Rent is defined as being the *surplus produce* of a farm; that is, when all expenses of cultivation and tenantcy—namely, labour, tradesmen's bills, poor-rates, tithe, interest on capital high-way duty, and the ordinary expenses of the farmer's family are paid, whatever remains

is the surplus, and should be handed to the landlord as rent. This is a theoretical view of the matter; and as such, however well founded as a proposition, cannot be acted on, because it leaves the farmer to be as extravagant as he may, at the expense of his landlord.

Nor is there any certain index belonging to a farm which points directly at the amount of rent. The land-tax, which is presumed to be laid *equally* on land and houses in every parish in the kingdom, is of all others the most *unequal*, owing to the caprice and ignorance of assessors, in many instances, and to the great improvements made on certain properties from local circumstances, which are not generally available. Nothing but an intimate knowledge of the locality, and of the state of markets, and the possession of sufficient means, can gaurantee a man venturing on a farm in the present position of the business. The parish-books may give him an idea how the farm has been valued by overseers of the poor. The composition for tithes, if so paid, will also lead him to calculate what a fair rent should be; because the amount of composition in lieu of

tithes, always varies between one-third and one-fourth of the real rent, except in some instances of hop-grounds, gardens, &c. A good deal depends also on the customs of the parish; whether subject to all tithes, or only to vicarial; how affected by turnpike roads, highways, and county rates, &c.

There is at present a prospect of the parochial burdens on land being somewhat lightened or made less onerous than heretofore, by the commutation of the tithes, which will at least be productive of convenience, and much more kindly feeling between the shepherd and his flock. The county rates, too, will probably be revised and moderated; and if the New Poor-law Bill, mercifully administered, be as productivd of good as is predicted of it, the farmers will be partakers as much or more than any other class.

The prices of labour in any locality where a young farmer may have a wish to settle, are a material item among his calculations. In former times, when money was not so plentiful as it is now, farm labourers were mostly paid in kind,

as continues to be done in Scotland at the present time. The labourers shared with the landlord, and farmer himself, certain portions of the produce as a compensation for their time and labour. But this excellent custom, which operated so beneficially for the domestic comfort, sobriety, and orderly conduct of the labourer and his family, has long ceased in England, and a composition in money has been substituted for the portions of flour or meal, which they used to receive as wages. In course of time it was settled (after the use of wheaten bread became the principal food of the labourers) that the value of half a peck loaf, whatever might be the price of wheat, should be considered as full wages for one day's work, and as an equivalent for the pay in kind he had formerly received. But as there are only six work days in the week, and especially since labourers have become liable to so much indirect taxation, their employers have been induced to allow somewhat more than the old standard. For instance, when the half-peck loaf costs only twenty-pence, the labourer is paid two shillings per day, or twelve shillings

per week; and if the same loaf cost only sixteen pence, the workman is paid at the rate of nine shillings per week. All this relates to what are called days' men; but there are many other particular labours, which are paid by what is called "the great." In ordinary years:—

Reaping, binding, and shocking wheat, from eight to twelve shillings per acre.

Mowing barley, from half-a-crown to three shillings per acre.

Mowing oats, the same.

Mowing buckwheat, or brank, the same.

Mowing clover, from half-a-crown to three shilling per acre, and one quart of ale and one of beer, per day.

Mowing rank meadows, from four to five shillings per acre, and ale and beer as above, per day. Such meadows yield about two loads of truss-bound hay to the acre. Other meadows or pastures are paid according to the bulk of crop.

Pea-picking, three and sixpence per acre.

Bean-cutting and binding, from seven to nine shillings per acre.

Turnip hoeing, twice over; first time six, and last time, two shillings per acre.

Ploughing by a hired team, fifteen to twenty shillings per acre.

Harrowing, per ditto, one shilling per acre.

Dung spreading, half-a-crown per acre.

Digging, one shilling per pole or perch.

Trenching, from two to four shillings per pole, according to the depth.

Haymaking, carting, and ricking, ten shillings per acre.

A team with drivers, at any kind of work, from fifteen to twenty shillings per day.

COURSES OF CROPPING, OR ROTATION OF CROPS.

This is a very material affair in the business of farming, and whatever rules are now acted on respecting rotations, have been all fixed by long experience. That the same kinds of plants cannot always, that is, year after year, thrive on the same spot is a very old discovery. And yet there are a few exceptions to this rule; wheat has been grown on the same field for above twenty years successively; but this has

been on extraordinary rich alluvial land, or where liberal or annual supplies of rich manure have been bestowed. But on land of ordinary quality, and which has been long cultivated, we find that a change of crops is most judicious because most successful. And the best change of cropping is found to be that which exhausts the land the least, and at the same time keeps it freest from weeds.

That land in the course of a few years will become overrun with root weeds is well known. Hence we must give up one entire year's crop in order to subdue and banish the weeds. The recurrence of this fallowing, generally directs or prescribes the order of changing crops. Some descriptions of land are so apt to run together into impenetrable masses, or to become so foul the third year after a perfect fallow, that it requires to be again fallowed after bearing only two crops. In such a case—fallow, wheat, beans, is the rotation; or if any change, it is by sowing clover on the wheat; and the rotation is then—wheat, clover, beans, and again fallow.

Another old fashioned rotation is, what is called the five-course system, namely—fallow,

turnip, barley and seeds, clover, wheat, and lastly oats. This rotation is objectionable, as scourging the land too much, and therefore the oats are thrown out, and a fallow recurs instead. The difference between these two systems is, that in the first, *one-fifth* of the arable land is every year a fallow; and in the second, *one-fourth* of the arable is fallow.

Now there can be no doubt about which is the best system; but it must be acknowledged that the choice does not always remain with the tenant; for sometimes he is bound by his lease or agreement to follow the five-course system, but much oftener by his want of means to adopt the other. If he can afford to keep live stock enough to make in the course of the year as much dung as will suffice to dress one-fourth of his arable land, he will certainly adopt the four-course system, even if he have to grow the quantity of oats required upon his turnip land; but if he be cramped by a want of grass-land, or otherwise restrained by a want of winter fodder in his yards and folds for a competent number of sheep and cattle, he will not be able to muster up more dress than will be sufficient

to dress only one-fifth of his arable acres. Of course he must, if also unable to purchase the extra quantity of dress required, continue in his old five-course system.

From this representation, it is obvious that a farmer cannot always do what is best for both himself and his land, if restrained by custom, by the terms of his lease, or for want of sufficient capital.

But the wisest and most spirited farmers are never bound by the custom of the country or by any fixed rules of popular rotations. He puts aside old fashions; and, seeing that nothing profitable accrues without a numerous head of live stock, so manages his land that, by introducing a greater amount of green crops, for folding or depasturing, so reduces the number of his arable acres, as brings the number requiring dress in any year, fairly within his means, and also enables him in all cases to apply his dress more liberally.

This is accomplished by allowing, as a first step, a portion of his clover to remain down for at least two years: mowing twice in the first

year, dressing it in the spring of the second, eating it off in the summer, preparatory to sowing with wheat in the autumn. Another scheme for reducing the arable portion of the farm is, to lay down a field or two lying conveniently to the homestead, and where water can be come at, into what is called permanent pasture. Thus, by keeping the "cold iron" out of the land, and by drilling an acre or two of mangel wurzel on the turnip land for stall-feeding cows or other cattle in the spring, together with sowing extra quantities of spring and winter tares, would give abundant facilities for breeding and fattening a full number of live stock, on which the success of modern farming entirely depends.

With respect to stocking a farm with breeding or fattening flocks and herds, whether at first, or in any following year, one precaution is particularly necessary to be observed, and that is, provide and *possess* the green food and fodder in sufficient quantities *before* the stock is bought in. There cannot be a more vexatious or unprofitable affair than to be assailed by a severe

winter and a late spring with a large live stock on hand, and not sufficient, or only inferior keep to afford. A farmer may have in contemplation to sow thirty or forty acres of turnips; and after due calculation, may conclude that he may want two or three scores of additional sheep, and actually give an order, before he can possibly judge how his turnips may ultimately turn out. The value of a turnip crop cannot well be estimated till the end of September, no more than can the amount and quality of fodder be ascertained; and therefore the buying-in should be deferred till after that time, even if a higher price must be given.

Such circumstances must always affect and direct the farmer in his plan of cropping, as well as in the variety and extent of his crops. And therefore it is not well to be too tightly wedded to any rotation, however much approved: his own views of what is proper—the number, character, and condition of his live stock, and perhaps the state of the weather, or local incidents, may cause him to depart from what he may have previously intended.

When a farm is once gotten into good heart, and freed from root weeds by alternately green and white crops, it may be kept so with but very little additional expense or labour, provided the crops follow each other in due course, and the drill husbandry be occasionally admitted.

When a field of light sand or gravelly soil is intended to be fallowed for wheat, the business of working and cleaning is sometimes completed as early as the first of June, in which case the land must lie naked till about Michaelmas, when the wheat should be sown. Now, it has been made a question whether this summer exposure recruits or deteriorates the soil; whether it gives a required rest, or exhausts the humid riches by exhalation from the soil. It has been many times proved, that a naked soil is more exhausted by the parching effects of the sun, than it is by any crop which shades it. Hence it has been considered good management to sow the fallow with some kind of shady crop, and which may be either taken or eaten off, or ploughed down before wheat-seed time. Buck-wheat, as already has been observed, is often used with

good results, either for ploughing in as a dress, or taken as a crop. But others say that yellow clover sowed thickly, and to be folded off by sheep before the wheat is sown, is doubly advantageous; first as shading the land, and next as enriching it for the benefit of the succeeding crop of wheat.

AGRICULTURAL MANURES.

The grand source of the farmer's supplies of dress or manures for his fields are his yards and folds in which cattle are kept and foddered, to which the cleansings of the stables, cow-houses, pig-sties, poultry and dovecots, &c. are constantly added. This accumulation is still farther increased by dung bought in, and any other decomposible matter that can be collected upon the farm. The general heap is chiefly intended for the fallows; on which the dress is carted when properly prepared by fermentation. For this purpose the whole contents of the yards and folds are thrown up into separate heaps to undergo the fermentative process. This reduces the

strawy parts of the dress; concentrates the virtues; renders it easier to be spread and ploughed in; and if bestowed before the seed is sown, and just before the fermentation ceases, the effect in exciting the germination, and nourishing the seedlings in the first stage of the growth, is most evident; as well as giving amplitude to the full-grown plants.

Many opinions have been held whether *raw* or *fermented* dung is most serviceable to plants. Without entering into the arguments held *pro* and *con* by chemical writers, it is only necessary to mention one practical reason for the necessity of fermenting dung, made as it usually is in farm-yards, which sets aside every other argument against it:—the seeds of many troublesome weeds are necessarily collected in farm-yards, stables, &c. brought in with hay, straw, and other forage plants; and which, were they carried upon the land uninjured, would be productive of the greatest annoyance to the cultivator. But by throwing up and fermenting the whole mass, these noxious seeds are either killed by the heat, or, which is equally destructive to

them, made to germinate before they are carried to the field. This single result and effect of fermenting farm-yard dung (together with its being easier managed in a half-rotten state) is a sufficient justification of the old practice of farmers. But there are instances of mismanagement of farm-yard dung, with which farmers are chargeable, and to which many of them must plead guilty. Many allow the fine rich drainage of their dunghills to run away into the nearest ditch, where it is entirely lost, or perhaps into the pond where the cattle drink! This is a positive and serious loss; for much of the best qualities of the dung escapes therewith. The easiest way of saving the liquor is to lead it into some convenient hollow accessible to carts to throw in any kind of earth or absorbent matter, which when saturated with the drainage, may be carted out and used anywhere as excellent dress, especially for grass land. Many such pitfuls may be made in a year, if the pit be emptied and re-filled as often as necessary. Another plan is, sinking a cess-pool in the lowest part of the yard, in which a pump is fixed to raise the liquor into a

water cart, by which it may be conveyed and sprinkled on any crop or surface requiring such assistance.

The surfaces of some farm-yards are made hollow intentionally; not only to hold the dung, but to prevent leakage therefrom; but this is not a good plan, because the strawy parts of the dung rot slowly, and never completely, if immersed in water. In order that the virtues of dung may be kept from being dissipated, it should never be exposed to the sun's heat, or to washing rains. If kept under cover, and only moistened with its own juices, to promote fermentation before it is used, it turns out the most valuable of all home-made manure. Dung-sheds are but seldom provided for ordinary farming; on large amateur establishments they are frequently seen, and no doubt this mode of preparing yard dung for dress is beneficial.

Another source whence land is enriched, is from mounds or mines of dung, mud, lime, decomposed vegetable matter, and all kinds of friable loam, &c. compounded together in grass or fallow fields for laying on the land. These com-

posts are usually turned once or twice before they are used, in order that the different materials may be thoroughly incorporated and sufficiently reduced for spreading.

Headlands in course of time are liable, from the action of the plough, to become higher than the general surface; but they may be profitably lowered by making a mine of and upon them. Let the headland be twice or thrice *gathered* by the plough, and on this accumulated ridge of earth spread layers of dung, lime, or marl, or chalk, which should be covered by the spade with earth digged from the sides. After lying so for a reasonable time, the mine should be turned from end to end, and again if requisite. This enriched body of earth may at the proper time be either removed to where it has been in time carried from—which is from six to twelve paces from the outside headland furrow—or carried to the top of the field, if it have considerable declivity. For it always happens, that when a field is declivious, the staple is sure to become deepest at the lowest side, at the expense of that at the top; which upper side is often worn

to the backbone, and then requires a relay from below, or from some other source, in order to keep the staple of uniform depth all over the field.

In some of our agricultural districts there are various earths, and sometimes at considerable depths under the surface, which when brought up and mixed with the arable staple, are of incalculable service. These earths are marl, marly-clay, chalk, clay, and limestone; the two last requiring to be burnt before they are fully useful as dress.

Marl is a limy earth mixed with clay, is of a brownish colour, and is diffusible in water. It is found sometimes in considerable beds at a greater or less distance from the surface, and when spread on light gravelly or sandy soil, gives tenacity to its texture, and renders it far more suitable for the nourishment of plants, and particularly turnips. And which, according to the old saying, "*get but heavy crops of turnips on such land, you may be sure of being successful with every other crop that follows.*" So much is marling found to be necessary in the County of

Norfolk, that whenever there are signs of a failure in the turnip crop—of their being attacked by *anbury* (a disease caused by an insect otherwise called "*fingers and toes,*") or other accident—it is immediately observed that "the land wants marling."

Marly clay is reducible by exposure to the air, and therefore is well adapted for laying on light land in order to making it more *holding*.

Chalk is a useful dress for both light and heavy soils. It is a powerful absorbent of moisture at all times; consequently keeps dry land cool, and clayey land open, from its absorbent quality; the frost acting on and disrupting moist bodies much more thoroughly than such as are dry. It is either obtained from open pits, or is drawn up shafts sunk from the surface to the chalk rock below; and in the last way is attended with considerable expense per acre.

Gypsum is also found in some places, and which has been strongly recommended as an assistant to vegetation, so that, as the manufacturers puffed, "it would double your crop;" but except, I believe, for land tired of broad clo-

ver, its pretended virtues as a dress have not been realized. Some kinds of chalk contain magnesia, and which has been believed to be hurtful to vegetation: but this is positively denied by an experienced chemical agriculturist.

Clay is composed of particles which are impalpable; and is viscid and plastic when moist. It may be burnt or rather reduced by a slow fire into a red-ash, and is then a fine dressing for tenacious soils.

Lime-stone as well as chalk may be burnt into lime, and which when slaked by water, or by water absorbed from the air or earth, is one of the most powerful stimulants to an inert soil that can be used. It is also offensive to many ground insects, and especially to one of the greatest enemies the farmer has—namely, the slug, which cannot live in contact with the least particle of caustic lime. It is, moreover, a destructive agent to some of the *fungi* which attack corn and other agricultural plants.

To the above may be added pit, or seashore

sand; which is of signal use in ameliorating stiff clayey soils; and for the same purpose sand, which may be collected on high roads, will be found beneficial. Indeed, the farmer should on every occasion be instant in collecting into mines or heaps, every kind of matter which would either enrich or ameliorate the staple: cleansings of ditches, ponds, and watercourses, are all applicable when free from weeds.

The above are the matters which every farmer has, or by accident may have recourse to in improving his land; but there are divers foreign substances which are highly useful as manures. Perhaps bone-dust is the most valuable; it being not only instantly efficient, but its effects are also the most lasting. It is equally suitable for grass or for arable land; and though a rather expensive dressing at first, cannot ultimately be so considered. Since it was first brought into notice, it has been extensively employed, particularly in the counties around the town of Hull, where many thousand tons of bones are annually imported entirely for crushing for the

use of farmers. There is a remarkable circumstrance relative to the effects of bones, which is rather startling to a common observer; it is, that the oldest bones which have lain on the surface of the ground bleaching in the air for scores of years, are as much valued for manure as those which are just brought from the slaughterhouse. The next foreign substance which is employed as a manure, is rape-cake after being ground into powder. After the oil is expressed from the seeds, the residue left in the bags is called the cake, and contains along with the husks a small portion of oil, which is said to be a suitable food for growing crops. It is usually drilled in with the seeds (though not in contact with them); it is intended to assist, and its effect justifies its use. It is only in the neighbourhood of oil mills where such cake can be had; or at seaports, where it is imported from the continent. Linseed cake was first used as a dress for grass land, until it was found that the cattle preferred the morsels of cake to the pasture; hence its appropriation as a fattening substance.

Soot is a manure, and is often, though not always a good top-dressing for wheat. In showery seasons the effects of soot are very evident; but in dry summers its effects are scarcely perceptible. It is, however, an excellent ingredient in composts.

Ashes, whether of coal or wood, are excellent top dress for clover and other grasses, and should always be used for such purpose. The plants of Dutch clover remain so diminutive in the turf until they are excited by the application of wood ashes, that it is actually asserted, the ashes *produce the plant!* a circumstance utterly impossible. It shows, however, how congenial the qualities of ashes are to the trefoil family.

Many other kinds of manufacturers' refuse are used as manures; such as the sweepings of clothiers', curriers', skinners', combmakers', tailors', and above all butchers' yards. Old rags, malt-dust, tanners' bark, saw-dust, &c. are all more or less useful on land. Cottagers' ashes, and cattle-droppings collected on highways and commons, are always eagerly bought up by farmers.

Many *universal composts* have been invented by speculative adventurers to engage the attention of farmers; several of which have doubtless much merit, as the *desiccated night soil*, for instance; but they are not so universally employed as the schemers expected, merely because they are too much puffed by the sellers, and too much expected from them by the buyers. Besides, the manner of compounding or applying those advertised manures, being out of the ordinary routine of farm business, deters the old systematic husbandmen from making a fair trial of them.

Chemists have been implored to come to the assistance of the farmer; and many have volunteered to direct their practice by the most scientific descriptions. But for my own part, and with the most settled inclination to avail myself of every particle of chemical advice which I could possibly obtain, I have only arrived at the conclusion that, were the profoundest chemist in Europe to become a farmer in any district of this country, his practice would not differ in the least from his neighbours around.

His professional knowledge could only avail him in discovering the predominating qualities of the various earths and substances found on, or which could be brought to his farm; as also their constituent properties, whether as manures or ameliorators of the natural soil. But all this is *known already* and by every the rudest, *homely hodge* that ever followed the plough tail. Experience has long ago taught all this; and though ignorant of chemical nomenclature, he is an unerring judge of everything of which he can make a good use.

AGRICULTURAL PLANTS.

The original genera of several of our cereal plants are now very imperfectly known, hardly any of them being found in an uncultivated state. The great length of time they have been in cultivation has very much changed there natural character; and such improved changes are still in progress.

In respect of wheat, botanists have detected several which they deem distinct species; among

these, the *winter* and the *spring* sorts are by far the most important to the British farmer, whether they be species or only varieties. But from them we have now numerous varieties, of which there appears to be no end; for every year brings forth some new variety superior, or at least said to be superior, to every other. I have already in a former page alluded to the fact, that some varieties are more productive, and yield flour of better quality than others; and of these, there are always two or three sorts which have a popular character, and are generally sown on the kind of land for which they are recommended. The robust and hardier sorts of red wheat are best adapted to strong loamy or clayey soils; the white-skinned varieties are most suitable for lighter soils; and for land of medium quality; that called the yellow-lammas is a favourite variety.

Improved varieties are gained by careful inspection of a growing crop, and by selecting one or several ears which appear to be identical. Rubbing the grain out by hand, to see the size and qualities, judge of the weight compared

with other known sorts; and afterward sowing it alone in a garden, or in a corner of a field year after year until a stock is gained. This process is much oftener necessary than it is practised; for it would repay the attention and labour were it for no other object than to obtain an *equal* sample of grain, which is always valued by the miller as well as the sower. Looking at the stock, or samples of wheat pitched or shown in any market, very few will be found unmixed. Red and white sorts, large and small, thick and thin-skinned varieties, all grown and sacked together; in which mixed state, though the produce may be greater, all cannot receive the most suitable culture.

That the produce is greater from mixed seeds, requires some little explanation: I believe there is no doubt about the fact; and it is accounted for on the old idea, that different varieties, as well as different species of plants, require different kinds of food; and therefore each variety can select its own peculiar food, and without being robbed by its neighbours. Whether this

be the real reason, I shall not presume to assert; but it is as rational an idea as can be advanced.

The qualities of wheat as tested by the miller and the baker, are those which should chiefly concern the farmer; nor need he give up quantity for quality; for these properties are often, or at least may be united.

Of barley we have several well defined species; and it is somewhat remarkable, that our best sorts in cultivation, are actually imperfect plants! They are imperfect in so far as instead of having four ranks of grain in the ear (the natural form), they have only two: but these, from the extra length of the ear and plump form of the grain, are found superior for every purpose to which it can be applied. The last new variety of barley which has been brought into notice is the *Chevalier*; a variety much admired for its colour, small plump form, weight, and its excellent malting qualities. Yet, like all other varieties of plants, it has only a temporary superiority; and therefore does not do to be sown too long in the same district. Introduced where it has never been before, it suc-

ceeds admirably; but falls off as it becomes habituated to a new station.

This, in fact, is the case with almost all our cultivated plants; and on which is founded that excellent rule which enjoins *a frequent change of seed.* Why strange or foreign seeds or plants should present a more vigorous growth than natives, is one of those anomalies in vegetation which is not easily accounted for; but the naked fact is unquestionable: and it may be truly stated, that a judicious change of seed from the most distant places, and from the most opposite descriptions of soil, is one of the easiest and most certain means by which field crops crops can be improved.

That species of barley called *Bere,* is remarkably hardy, and therefore useful in northern climates. In more southern latitudes, it is most commonly sown as spring food for sheep.

Rye, of all our cereals, has remained truer to its natural habit than any of the others; there being only two sorts. This, perhaps, may be owing to its flowering so much earlier than those which are most nearly allied to it; though from

its nearest alliances it could not by intermixture of the pollen, receive any improvement in bulk of grain; which is the only particular in which rye could be a more useful plant to mankind.

Of oats, we have many varieties differing in colour, form of the panicle, and in size and weight of grain. All these have been, it is probable, improved from the wild variety often too common in our fields. New varieties are occasionally discovered; especially in Scotland, where this grain is cultivated so extensively and with so much care. The excellence of oats consists in their short plumpness, thinness of the husk, and weight per bushel. Their yield per acre, depends greatly on the richness of the land on which they are raised; and it is often affirmed that no crop pays better for a liberal supply of the very richest dress; in which case, they should be sown thickly, that is, at least six bushels to the acre. In the South of England, unless where a great deal of straw is wanted for foddering and making into dung, oats may be purchased cheaper in Mark Lane, than they can be grown on a turnip-land farm. The *naked* oat is a curious variety; but it is one of the

least productive. The white and black or red Tartarian, and black Poland, are the largest growing varieties; to which may be added the Hopetown: but the potatoe, Angus, and small black sorts are also prolific, and of good weight per bushel. The south of England is rather too warm for the perfect growth of oats, unless the land is exceedingly rich, or is abundantly dunged for them.

Peas. The rankest growing varieties of this pulse are chosen for cultivating in fields. These are the hog, or horn-coloured, the maple, so called from the varied colour of the skin, and the nimble. All these have red-coloured blossoms. The two first are most commonly cultivated, and require rich heavy land. The last requires a lighter loam, and are sown with the intention of coming off time enough to be succeeded by turnips. This I have seen conveniently and profitably done on the mellow loams of Northamptonshire; but in my own practice, although the peas were carried about the first of July, the crop seldom paid expenses. And yet it would be a most desirable result, to *steal*, as it were, a

crop, which would not preclude a crop of turnips also.

White peas for *boilers*, and for the seedsmen, are also grown by farmers, but they are always accounted a "*casualty crop*"; because if attacked by the *aphides* or shrimp, in a warm May or June, very few pods will be formed; and again, if showery weather happen after the pods are ripe, many burst out and shed the seeds.

Field beans are small varieties; of these the Tick, Harrow, and Heligoland, are the most common. Sometimes the Mazagan are sown and used as horse beans: and it would be well if a still earlier sort were brought into cultivation for the sake of getting them sooner out of the way of wheat sowing. The black aphis very frequently fix on the tops of beans, and of course injure the health of the plants. When these insects make their appearance, if not too early in the summer, children should be employed to top the plants, and destroy the insects. The larger varieties of garden beans are sometimes raised by farmers, and if successfully, fetch a high

price in market. But nothing of this kind should be attempted unless the soil be clean, and in perfect good condition; and also that full time can be afforded, and close attention given to the culture during the summer. Half measures do not do with anything that is undertaken, and out of the common routine of farming.

Clover;—of this useful forage family, there are several useful species, namely, the red or broad clover, the white or Dutch, and the yellow or black trefoil; and to which may be added the flesh-coloured. The introduction of these plants into British husbandry has been productive of the greatest advantages; not only in relieving the land from the too often repeated burden of white crops, but also in yielding abundant supplies of winter fodder and pasturage at other times for flocks and herds. The three first are sometimes sown separately, but frequently mixed together, according as the ley is intended to lie down one or more years. Broad clover rarely lives over the second year: and therefore is never depended on in laying down permanent pastures; but there are two other perennial

broad clovers or cow-grass which are used for this purpose.

Dutch clover and the yellow trefoil are perennials; the first is sometimes sown alone for sheep keep, or when intended for seed; but when mixed along with ray-grass, they together yield a heavy swathe of excellent hay. The flesh-coloured clover has been but lately introduced into this country. The seed is harrowed into a wheat stubble in September, and if it take well to the ground, is ready for the scythe in the following May or beginning of June. The seeds, it is said, do not take so well on fresh ploughed ground as they do on a firm and sufficiently harrowed stubble. But in neither way, though an early shooting plant, is it considered more valuable as a spring forage than the common vetch.

Sainfoin is cultivated for the same purposes as the clovers; that is, for both hay and pasturage. On suitable light loams with a chalk or gravelly subsoil, it does well; and is ready for the scythe a few days before broad clover; generally about the middle of June. It is a per-

manent plant, and if it rise well from the seed, continues profitable for eight or ten years.

Lucerne is cultivated as a green fodder for horses or other cattle. It succeeds best on a chalk subsoil, which its deep running roots can reach in dry weather; but requires much care in keeping free from weeds: for which purpose it should always be sown in drills.

Tares, or vetches, are by far the most useful green food for working horses that can be cultivated. There are two sorts; differing but little in value or appearance. The winter tare is sown in September or October, but the sooner the better, upon a well dunged piece of wheat stubble. A cast of rye is usually sown with the first tares, to draw and hold them up. The crop will be fit to mow as wanted between the sixth and the fifteenth of May in ordinary seasons. Spring tares are sown in February and March; and intended to succeed the winter tares. On mild loamy land in high condition, winter tares yield a second crop; or if they do not, the ground is fallowed and redressed for turnips. A vetch

stubble, however, requires repeated ploughing, harrowing, and rolling before it can be got into a kindly state for turnips.

Potatoes: these are always more or less cultivated by farmers, either for market or for family use. When grown for market on a large scale, they are managed with the greatest care, on richly dressed and well ploughed friable land. And if near a populous city or town, they are raised as soon as the tubers are large enough to fetch *one penny per lb*; the cleared ground being immediately got ready for turnips or some other crop. If the potatoes are intended to grow to perfection, the tubers are not ploughed or forked up until the haulm is dead, and which usually happens in September or October, to prepare the land for wheat. The early Champion, and early Shaws, are generally preferred by Middlesex farmers: but there are many other sorts which are equal if not superior to these in quality, but inferior as to yield: and when wanted for cattle feeding, *quantity* is a material point.

Rape or coleseed is sown for sheep and lamb

feed in summer, especially in moist or fenny districts, in which localities it arrives at considerable bulk, and is of great assistance to flock-masters in those countries. It is very frequently first eaten over by sheep, and then allowed to stand for a crop of seed. The leaves are of a very fattening quality, and considered much more so than white turnips.

Mangel wurzel or white beet, is now very generally cultivated for stall-feeding in spring, when other succulent food is scarce. Milch cows do well with it; and it is an useful ingredient in the artificial food of all other live stock. Its greatest defect is its liability to be destroyed by frost; against which it must always be carefully protected. Mangel is treated in every respect like drilled turnips. The leaves are cut off and used before the roots are taken up to be stored, which should always be before the beginning of December.

Kol Rabi is an agricultural plant partaking of the nature of both the cabbage and turnip; the leaves are narrow and do not fold together like the cabbage; but it has a very large protu-

berance on the stem, the inside pulp of which is crisp and nutricious, and much relished by cattle. It is managed like the Swedish turnip in drills, and is perfectly hardy.

The turnip is one of the most valuable of agricultural plants. It not only occupies and shades the fallowed surface, but grows into such a bulk and weight of food for sheep and other cattle, that it may truly be said to be the foundation on which the success of all our other crops depend. The seed time for turnips extends from the twentieth of May, when Swedes may be sown, until the first of September, when wheat stubble turnips are committed to the ground.

There are many varieties, but the following are chiefly sown in fields, viz:—

The Swedish, which is particularly valued for its extreme hardiness, size, weight, and for the great share of nutriment it contains. They are always the first sown of the season; say about the end of May: though they may also be sown throughout June and July. Swedes are the last to be eaten off, as they are not only best able to stand the vicissitudes of winter weather, but

are also latest in running to flower. They are apt to degenerate; and therefore require some attention in keeping them true. This can only be done by transplanting the true, well formed, short necked bulbs; and when in flower drawing out the *yellow* flowering individuals.

The tankard variety is a quick growing sort, but the greater part of the bulb is above the ground, and being tender withal, are soon destroyed by frost; on this account the tankards are always eaten off first.

The Norfolk white, is one of the best of our field turnips; before it runs to seed, it is juicy and easily scooped out by sheep: many of the bulbs descend deeply into the ground; and these are found, when picked out for the sheep, to be the most juicy, and are most relished by the flock. I have often thought that were the seeds of those deep rooting individuals saved and kept apart as a new variety, such would be a desirable sort, not only for their better quality as food, but for their ability to withstand the effects of drought, while shallow rooting plants would be parched up.

The green and red rounds are good varieties, and yield a great deal of keep; but as they stand almost entirely above the surface of the ground, are more likely to be damaged in severe winters.

There are several other sorts both of white and yellow varieties. The latter are the most hardy and nutricious; but from their soundness are unfit for *broken-mouthed* sheep. This is the greatest objection to Swedes; but if sufficiently sliced by the pickers, sheep of any age do very well upon them. The stone or stubble variety is a small early sort. It, as already mentioned, is preferred for sowing on wheat stubbles in autumn, to have a chance of a little green picking in spring.

As it sometimes happens that the whole crop of turnips is lost by frost, many plans have been practiced for their preservation. One method is, by what is called *placing*: the furrows between the ridges are filled in by a 'bout of the plough, the turnips on each side being first pulled and thrown to the ridge out of the way of the horses. The turnips are then laid head to head on the

furrows just opened, and pretty close together. The next 'bout of the plough covers these, and another row is laid in the next furrow and also covered by a third 'bout. This laying and covering is covered till all are interred. Drilled turnips are preserved by being earthed up by the plough. Another mode of saving the crop is pulling and storing them among dry straw in any hovel; or by placing them close together on dry turf with their leaves on, and in hard weather covered with straw.

Carrots are a fine nutricious root for either working or fattening cattle. But they cannot be profitably cultivated every where; it is only on fine mellow loamy soils, which are naturally rich and deep, that the carrot can be raised with advantage. Their culture on stiff or thin gravelly land should never be attempted. The variety called the Altringham is the best for farmers' purposes.

Cabbages, both the large red and the drumhead varieties, are grown in fields for cattle. They are usually sown on a seed-bed in spring, and transplanted in rows on well dunged land early

in summer. Their yield of vegetable matter is is very great; and as such for store stock are most useful: but the fattening properties of cabbages are not so highly esteemed as either the turnip, carrot, parsnip, or beet. Cabbages may be drilled and managed like turnips; and, moreover, the best and most weighty crop of York cabbages I ever saw, were sown broad-cast on a field of four acres, and hoed out like turnips, after answering the purpose of a seed-bed whence thouands were drawn for transplanting elsewhere.

Grasses.—The plants which form our best permanent pastures, are of the greatest importance to farmers. It used to be thought that a good meadow or pasture could not be formed by art, or at least could not be effectuated but under a long course of time. But such is our improvement in this matter, that we can lay down permanent pasture which is fully productive and serviceable in little better than two years.

This practicable improvement has loosened the hands of tenants by relieving them from the restrictions imposed on them concerning the preservation of old grass-land, however worn out,

mossy, or useless to them, and by putting in their power to bring an old pasture into the arable rotation, much to their advantage, and general improvement of the farm. It is a common saying that land which has been long cropped under the plough, requires *rest*, and surely their cannot be a more profitable way of resting an exhausted or tired field, than laying it down in grass. The expense of the seeds has been an objection with many farmers, especially while impressed with the old idea that no man who lays down a meadow or pasture, can ever live long enough to see it in perfection. But this is, luckily, a mistaken notion; and besides, the very superior crops of grain which follow the breaking up of old pasture fully compensate for the extra expense of grass-seeds.

The value of the grasses and other plants, which together constitute our richest pastures, are all now-a-days perfectly well known, and their seeds, in any quantity, may be had at every seed shop.

When a field is intended to be laid down as a permanent pasture or meadow, it can hardly

be done too carefully. It should be deeply ploughed, richly manured, freed from every kind of weed, and be perfectly pulverized. In fact, it should be thoroughly fallowed as an indispensable preparation. No kind of corn should be sown with the grass-seeds. The months of May and August are the two best seasons for sowing; the former certainly the most elegible, if followed by a dripping summer; otherwise the latter if the contrary: and as whether the summer turn out dry or wet is a matter of uncertainty, the best season to be chosen will be from the first of August to the end of September.

The late Mr. G. Sinclair, author of *Hortus Gramineus Woburnensis* studied the subject of grass culture, with very great success, and has left us very useful instructions on this important branch of husbandry. He attributed the failures of previous attempts in laying down permanent pasture to the inferior kinds of seeds used; and their being insufficient in quantity; and particularly to the great error of sowing the seeds with corn crops, which either choked or starved

choked or starved the slender seedlings. He gives the proportions of the various pasture grasses, which should be sown together as under:

Cock's-foot	2 Bushels
Meadow fescue	2
Meadow fox-tail	2
Rough meadow	2
Tall oat soft	0½
Meadow cat's-tail	15 lbs.
Hard fescue	2 bush.
Crested dog's-tail	1 do.
Nerved meadow	0½
Wood meadow	1
Narrow-leaved meadow	0¼ bush.
Broad-leaved bent	0½
Ray-grass	1 do
Dutch clover	15lbs,
Bush vetch	0½
Sweet vernal	0¼ do.
Perennial red-clover	12 lb. and
Millfoil	4 do.
The whole	15 bushels.
Other seeds	46 lbs.

Four and a-half bushels of this mixture are

deemed amply sufficient for one imperial acre; allowing for unfertile seeds, and other accidents. The larger seeds should be mixed and sown by themselves; and afterwards the smaller seeds; both of which should be but slightly covered: one tine of the harrows after the large seeds, and the roller only to cover the smaller.

Should any deficiency appear in the young sward, a little of the same mixture should be sprinkled over, and if a top dressing of rich mould were also given, it would be beneficial. Repeated rolling is necessary to consolidate the the surface and give the seedlings a good hold.

No cattle or sheep should be put on the young grass during the first summer, but it should be frequently skimmed over with a keen scythe, to prevent the plants running to seed; because the plants should be induced to tiller-out and spread, rather than be exhausted by the production of seed. The appearance of the new turf will show when sheep may be turned in with safety; for as soon as there is no risk of the plants being pulled up, the more it is depastured the better.

Thus will a piece or field of the best grasses be laid down permanently, and be on the improve for many years; yielding annually either excellent hay or rich grazing.

There are several other agricultural plants which engage the attention of British farmers, namely, the hop, saffron, flax, hemp, medical poppy, and Teazels or clothier's-brush. All these I have seen cultivated: but having no experimental knowledge of their culture or value to the cultivator, decline advancing any thing concerning them, which I could only extract from other books.

DESTRUCTIVE ANIMALS.

The wild animals injurious to farmers are all so well known as to need no description. Rats and rabbits, where allowed to become too numerous, are serious enemies; and it is a pity that the latter are under the protection of the game-laws. Foxes destroy rabbits, and so far, are useful to farmers; but if they allow them to visit their folds or hen-roosts, they have only them-

selves to blame. Polecats, stoats, and weasels, are dangerous to poultry; but even they kill great numbers of mice; and if they frequent barns or rickyards, neither rats nor mice can abound.

Among birds, the owls are the most indefatigible mousers both about the homestead and in the fields, and therefore should be cherished wherever they may take up their abode.

Next in usefulness are the rooks, which live for the greatest part of the year on grubs which devour the roots of grass and corn. In very dry weather the grubs descend into the earth: and the ground being hard at the same time, the rooks cannot dig deep enough to reach them. Thus half famished, the poor rooks are driven to invade a field of wheat or barley, just as the grain begins to ripen, or perhaps to a cherry orchard, to allay hunger. But from committing such depredations they are easily frightened away by a vigilant keeper; but allowing that in these instances they are mischievous, the good they do at other times far outweighs such damage.

The jackdaw, jay, magpie, and crow, are also insectiferous; but the two last are rather too

fond of eggs, and even young chickens, when they can pilfer in safety. The crow is occasionally a good sentinal in the fields; he always gives notices of approach of a fox, a strange dog, or other prowling animal; and if his nest be near a field of peas, he will allow neither house nor wood-pigeon to come near the crop; nor is he very civil to the rooks if they come near his dwelling.

These birds are often seen among turnips; and into which they will sometimes dig holes; but their chief business is digging the small grubs out of the tubercles on the outside of the bulbs: thus destroying tens of thousands of those insects which would occasion clubbing of the roots in another summer.

Among birds, the finches will certainly assert their right to a share of the farmers' turnip seed; but it should not be forgotten that they destroy great quantities of charlock, and field radish seeds, besides many kinds of caterpillars. Again, the finches, and particularly the beautiful goldfinches, are constantly employed in the service of the farmer in devouring *thistle seeds;*

they choosing no other while these can be found. The seeds of the strangle-tare are eagerly sought for by the turtledove; and those of the wire-weed by the lapwing. The fact is, there are very few birds, whether great or small, that we could well spare, except, perhaps, the house-sparrow; which though very useful while rearing their young, which they feed with caterpillars, they are professional and dexterous thieves all the rest of the year.

Among the *mollusca*, the snails and slugs are the most formidable enemies; often destroying, when not opposed, whole fields of young wheat. I have already adverted to their economy, and stated how they may be banished or destroyed; and therefore need add nothing farther in this place. Earthworms are serviceable rather than otherwise; they keep the surface perforated for the admission of air and moisture; and even furnish a kind of top-dressing by their casts. Where earthworms prevail, their natural destroyer, the mole, is soon in attendance; and these last are often useful as drainers of flooded land.

Among insects, the farmer has several opponents which often baffle his best exertions. The turnip beetle is certainly the most pestilent, as well for the extent, as for the suddenness of their attack. That they lay their eggs, and undergo their transformations under the surface of the soil, has been ascertained; but neither as eggs, caterpillars, nor chrysalides, are they destructible by any known ordinary means. The perfect insects are always in existence; and though they can subsist on many kinds of plants, as young barley, and all the cabbage tribe, yet they prefer the young turnip to everything else. Like insects in general, they congregate for the purpose of procreation; and can fly from all quarters to these general meetings in turnip fields. Here they begin to appear with the turnips about the fourth day after sowing; and are led to discriminate and choose those seedlings which are most agreeable to their palate. Strong, rank-growing seedlings, the insects will scarcely touch: but weakly ones—such as have risen from *old seed*—or have risen *slowly*—or very *thickly* together—or on *dry* or thin *poor* land,

will be the first fallen upon, and devoured. Hence the cultivator must endeavour to procure new seed—to prompt his seeds into rapid growth by sowing on a perfectly pulverized and rich soil, as soon after the dress is ploughed in as possible, and before the ground becomes harsh or dry. But these particulars have already been alluded to.

Several other insects attack the turnip crop; namely, the wire worm, the grey grub, and the black caterpillar. The wire worm is so called from the toughness of its yellow skin. They are not quite an inch in length, and are the larva of of a long-shaped beetle, called *Elater*, or springing-beetle. This insect when handled, counterfeits death; and when turned on its back, can, by some elastic mechanism between the thorax and abdomen, spring aloft in the air to regain its natural position. They eat all sorts of bulbs and tubers, and are often found in mellow loam procured for the florist's purposes. They gnaw through the taproots of turnips, after the plants are set out; and consequently cause many blanks in the crops. The florist's remedy is to bury pieces of old turnips or potatoes, as traps

to attract them from the crop, and in which they are easily caught and killed. The grey grub carries on depredations on the roots of many plants, much in the manner of the wire worm; and, as they are four times the size, are far more voracious, and often do much damage in a field of turnips. They are the larva of a brown moth.

The black-jacks or caterpillars, so destructive to the leaves of turnips, are the larva of a yellow-bodied fly; they lay eggs on the perfect leaves, and retire to the ground in autumn, and come forth as caterpillars in summer, and if they fall upon a field of young turnips, pass over it like a pestilence, devouring every leaf in their way. There is no warding off such visitations; if the caterpillars appear before the plants are hoed out, the hoeing had better be deferred, in order to afford a greater feast to the insects, and probably save some for the sheep. The caterpillars have only a certain quantity to eat, or rather a certain time to feed; for as soon as they have their fill they are changed into the pupa state, and soon after assume their perfect form,

and may be seen flying under hedges in the autumn. Naturalists have advised, that a brood or two of ducks should be driven over the field as soon as the caterpillars appear, in order to give the ducks a feast. This might be easily tried; and, if the result were as expected, it would be a double advantage—fattening the ducks, and saving the turnips.

The large grubs of the cockchafers and hoary beetles, are both detrimental to the roots of grass; but being the natural prey of the rooks, many are destroyed by them, either as grubs or as beetles.

Luckily some of these insects appear only occasionally—not regularly every year. In my own experience I suffered from the black-jack, only twice in twenty years; and never at all seriously by the grey grub; but this last has has done much mischief of late years.

Insects that annoy cattle, are the family of ticks; together with various species of flies, which either bite, or tease, or breed upon, or in the bodies of brute animals.

The sheep tick is well known, and very com-

mon. Old sheep seem not to be hurt by them, though young sheep are very sensible of their bites and movements on their tender skins. Another tick fastens itself on dogs and cows, in some parts of the country. This species moves about when young; but when once they fix themselves, there they remain till fully cloyed, and at last drop off from their unwieldy bulk.

The green-gold fly deposits its eggs on the moist rank fleece of unshorn sheep, and upon any wound, whether before or after they are shorn. The eggs soon become active maggots, and will even eat into the sound skin, and eventually would kill the animal, if not relieved in time.

The breeze or gad-flies, deposit their eggs on the backs of cattle, and teaze them sadly by stinging them with their lancet trunks. Another species ejects her eggs into the rectum of horses, and in so doing, sometimes renders the horse unmanageable. Another fly deposits her eggs on the hair of horses, behind the fore leg or other place, where the instinct of the fly directs that they may be licked off and so con-

veyed into the intestines of the horse, and there to breed. These nits should always be groomed off. Many other insects are bred on, or in the bodies of cattle; but against which no remedy can be provided. One circumstance, however, may be relied on, and that is, the better condition cattle are kept in, the less they are subject to be attacked by vermin of any kind.

The diseases of cattle of all kinds, and the accidents to which they are liable, is a subject which every farmer should be acquainted with. Veterinary knowledge is now universally diffused: but in all cases requiring professional skill, it should be applied without delay; it is often dangerous to employ a conceited country quack, or ignorant cow-leech, when better advice may he had. I have always found the services of the superior farriers to be the most effectual, and also the least expensive. To this there are some few exceptions; here and there we sometimes meet with a very obscure uneducated individual, who, however, is an invaluable assistant among cattle.

THE WEEDS OF AGRICULTURE.

It is not only necessary that a farmer should be well acquainted with, and know the names of all profitable plants in common cultivation, — he should also know those plants which appear in his crops, whether as usurpers of the land, or deteriorators of his grain when brought to market. These last are properly called weeds; and these should be known in order to their extirpation.

The weeds which encumber the soil and rob the crop, are the following, viz:—

Couch grass: this is a very prevalent weed, and costs more labour to get rid of than any other. It propagates itself by its running under-ground stems, every inch of which, if broken so small, becomes a new plant. It runs rapidly over sandy soils, but is the most easily got out of such by the plough and harrows. When couch has got possession of a clay soil, it can only be extirpated by fallowing for a whole year. Neither

horse nor hand-hoe is available against this weed; they may keep it down, but cannot destroy the root. Were it not for the prevalence of this grass, fallowing would be much less necessary than it is; for when it gets full possession of the surface, nothing but a fallow can relieve the land from its embrace. It is worked out of the land by repeated ploughing and harrowing; collected into heaps and burned, or carried off. This is the usual process; but I have known couch got rid of by repeated ploughing only: but this must depend upon the intervals between the ploughings being studiously short. Notwithstanding the troublesome character of this plant, the qualities of its scanty foliage, and particularly of its roots when washed and dried, are most nutritious and eagerly eaten by cattle.

Next in frequency, and tenaciousness in keeping possession of land, is the knotted-rooted yellow oat-grass. Every one of these little bulbs, composing the aggregated root, becomes a new plant if separated; and therefore it is better in clearing a field of this grass, to carry off entirely the whole tussock without beating,

lest some of the bulbs should be broken off. Indeed, wherever and whenever this grass is observed on arable land, the tussock should be digged up and carried away.

Another very noxious species of grass, is what is called the Black Bent. Its appearance among wheat is a certain sign that the crop will be inferior. Its history is curious; because its existence upon two very distinct descriptions of land, shows that in both cases mismanagement has brought forth the plant. On gravelly soils, when the wheat is sown late, and the land too wet and cold, the black bent will rise among the wheat abundantly and injuriously. And on the other hand, if one description of clay soil met with in some parts of Middlesex, be sown when it is *so dry* as not to *slide back* again after the plough, the black bent will rise in such quantity as nearly to choke the wheat. Thus *too much* moisture is the cause of its rising in one case, and *too little* moisture in another; showing, that the wheat and the grass require certain conditions of the soil which are different from each other. Local experience can only guide

the farmer in such cases, there being other circumstances of the same kind respecting the encouragement or discouragement of farm weeds; as will appear in the history of other weeds, hereafter to be noticed.

Docks are common field weeds, and as every the smallest portion of their descending roots will grow, they are increased by division. Drawing them in wet weather is a good plan; and when they infest meadow or pasture land, a cloven dock-iron is useful. When reaped or mown, with either corn or grass, they should not be carried to the barn or rick, lest the seeds be scattered and again be carried to the fields unwittingly. If dock seeds appear among those of grass, the stock is undervalued and avoided.

Dandelion is chiefly a meadow weed; but having a flying seed is also common in arable land. Its root is similar in tenacity of life to that of the dock, but not being so tough, cannot be so effectually drawn.

Of thistles there are several species which annoy farmers: most of them appear in pastures; but the worst of them is the field-thistle, which

has got from reapers the name "cursed." Its seeds are seldom seen; but it increases itself rapidly by its underground stems far and wide; and as these stems are thickly beset with buds, each producing an upright shoot, these soon occupy the surface, and of course exhaust the land. Among wheat they are most troublesome, and require spudding twice or thrice before the wheat gets too high. Fallowing checks them most; but it does not always extirpate them. Much depends on the time when they are disturbed and cut over by the ploughshare. I never could conquer the thistle by deep and repeateadly ploughed fallows; but I once had a neighbour, who having a rather loamy field sadly overrun with thistles, got rid of the whole in one summer's fallowing. This result, so different from what happened to myself in the same season, I could only attribute to my neighbour having put in his teams just at those critical moments when the plants were most susceptible of fatal injury.

Coltsfoot is another deeply rooting plant, found on clayey or deep loamy moist soils. The

same difficulties occur in banishing the coltsfoot, as are met in extirpating the thistle; though the attempts to do so are exactly similar. Along with the coltsfoot, we always meet another, which is equally unsightly in a crop of corn; namely, the mare's-tail; and sometimes also horse-tail: both of which are properly aquatics, but can also subsist in any humid loamy earth, and especially where rain-water is liable to lodge for a day or two.

There are two sorts of bindweed in fields; the first is the small field convolvulus, which runs close upon the ground, or climbs the stalks of corn. It is frequently among barley, its growth of running roots being favoured by the preceding crop of turnips. In consequence of its numerous runners underground, it is no easy matter to clear the soil of it, but it is no otherwise hurtful than by robbing the land and sometimes surmounting the barley and binding tufts of it together. The other larger bindweed grows mostly in hedges, but sometimes creeps out into the ploughed land, where it developes itself much like the smaller one, only its flowers are white, and leaves much larger.

The tine-tare is troublesome among wheat; first starving the plants, and next growing over and strangling them. Although an annual plant, it does not vegetate every year, that is, the seeds lie dormant till a very wet spring occurs, when it appears in great vigour.

Charlock, Field-radish, and Red-weed or poppy, are all annual plants; but it is only in some seasons they are particularly prevalent and injurious to the crops of wheat. It has been already stated, that if wheat be sown in too loose and dry a soil, and it be not firmly consolidated by pressing, rolling, or treading, a numerous birth of those annual weeds will certainly appear in the spring; and go far to rob the farmer of half his crop. A little relief may be given by weeding in April and May; but this is only partially effective. But the best preventive is to lay in the wheat seed rather heavily; and then there need be no fear of being overrun with annual weeds. When the seeds of any of those weeds appear in the bulk, they are discharged by the sieve and skreen.

Horse-mint is a troublesome weed, in conse-

quence of its roots being numerous, running in all directions around, and producing shoots and roots at every joint; neither will it die, however long it may be exposed on the surface.

Knot-grass, or wire-weed, is well known to turnip-hoers, from the extreme toughness of its stem, which can but with difficulty be cut.

Cammock is a weed still found in some places. The root is so tough that neither plough nor harrow can root it up. It requires a sharp mattock to grub it out.

Weeds whose seeds deteriorate the sample, are, first—Cockle. This is one of the most elegant of our corn flowers; and is succeeded by pretty large capsules or pods filled with black seeds nearly as large as those of radish. Cockle sometimes grows among wheat, but chiefly in barley; and when thrashed therewith very much lessens its value at market. Whether sown with, or made up for market with such conspicuous seeds intermixed, is an unnecessary piece of neglect; because the sieve-maker can furnish a sieve which will take out every seed

of cockle as well as every other seed of the like size. Every farmer should possess a cockle sieve, which he will find very useful for many other purposes in the barn or granary.

Burs are the seeds of cleavers or goose-grass f they are difficult to get out of corn by any o our ordinary means; a piece of baize-cloth on which the corn may be thrown, or over whic it may be made to run in some way, would collect most of the burs which come in contact with the baize by their sticking to it. Here the cockle sieve will also be useful.

Horse-gold is the provincial name of a seed which appears in both wheat and barley. The seed is round, concave on one side, and convex on the other, with rough inverted edges. It does not readily pass the skreen, nor is it separated either by winnowing or by throwing. It is produced by a slender, erect, herbaceous plant, having a flower like a small buttercup, and, in fact belongs to the same genus. (See botanical name in Appendix.)

Darnel is an annual native grass, and rarely met with but among wheat. It resembles its

congener, the common ray-grass, only it is *thrice*, its size. If thrashed with wheat, its seeds being as large and as heavy as the smaller grains of wheat, there is no means of separating them. And if darnel be detected in the sample, few will buy the wheat; and if they are ground together, the flour will be spoiled, and the bread made of it is, if there be much darnel, actually poisonous. Luckily darnel is not so prevalent among corn as it used to be; and if the attention of farmers and their labourers were bestowed to collect the spikes when met with in the fields, or in the barn, this horrid weed might soon be banished out of the country. The seeds are extremely bitter; and if infused in drink, the liquor is decidedly stupifying; hence it is called "drunken darnel." It is often confounded with the next weed to be noticed, but which is a very different, and perfectly innocuous plant.

The Rye-like Brome-grass: this is also a native annual, and most common among wheat. Among the generality of farmers and millers, it is erroneously called *Ray*, which name belongs to the darnel rather than to this. They are

known from each other by their very different form. The darnel has its seeds arranged in a long flat spike, a foot or fifteen inches in length: whereas the brome has a spreading, *nodding panicle*, spiklets all hanging one way. The panicle or head of seeds, is borne on a jointed straw, two or three feet high; very heavy, and readily eaten by poultry and all other animals, while the darnel is rejected. The brome seeds are smaller than the darnel, and in flavour are like oats. They are mostly got out of wheat by the skreen and by throwing; but if any remain, they lower the price.

Crow needles, so called from the elongated shape of the seeds. They are produced by a dwarf growing plant, common everywhere, particularly on light land. They are a plague to barnmen, as they are not easily riddled from the corn, except by the wire sieve, to bring them to the surface to be picked off.

Melilot-clover is a species of trefoil which sometimes rises among wheat, and its pods appear in the sample, and are detested by millers;

as when ground with the wheat give the flour a rank disagreeable scent. The plant should be weeded out in the spring, as it sheds many seeds before harvest.

Wild oats are sometimes harvested with other corn and deteriorate the sample if not cleaned out. They are best detected by the reapers, who should be ordered to throw them aside.

Black bindweed is a species of brank which infests some fenny soils, and in wheat injures the sale. The cockle-sieve gets rid of the seeds effectually.

Annual snakeweed is another fen weed, and occupies and exhausts the land as well as reduces the value of any grain in which its seeds are present. Here, again, the cockle sieve is the best riddle.

Spurrey is frequently seen on sandy or light gravelly land. Although it comes up very thickly over the surface, it never attains to any great height unless upheld by other plants. Its roots, stems, and leaves are all very attenuated, and never arrive at any considerable bulk. A

strong growing species of this plant is cultivated for sheep-keep in Belgium; but is only sown on poor soils where nothing better will grow.

May-weed, is common on poor land, especially where the drill husbandry is not practiced. It is a surface weed, and disappears under the action of either horse or hand hoe.

Corn marigold occupies much space among corn, and is consequently a robber of the soil where it prevails. It is banished by fallowing.

Besides these annual and merely surface weeds, there are several others common on all descriptions of soil, namely—groundsel, annual meadow grass, chickweed, shepherd's-purse, common fumitory, &c.

Meadow or pasture weeds, are—dwarf thistle, ox-eye daisy, wild thyme, ragwort, knapweed, hawk-weed, cow parsnip, yellow rattle, common daisy, orchis several species, and sedge. All these are got rid of or kept down by spudding or drawing.

Orobanche major, called provincially Broom

rape, is a parasite plant, living on the roots of several plants, particularly those of common broom and broad clover. Among clover it comes up in greatest quantity in the second crop saved for seed; and as it is cut and carried therewith, it is a question whether its small seeds may not also be sown with clover. This is an object worth the seedsman's inquiring into; as good magnifying glasses would show whether the smaller seeds of the broom-rape were among those of clover.

Another weed which sometimes appears profusely in second crops of clover is the Self-heal; and from its constantly accompanying clover crops, urges the idea that it is also sown with it. The plant has no very distant resemblance to clover; and as it ripens seed about the same time, it is not improbable but that it may be mixed therewith. This is another matter which should engage the attention of seedsmen.

The following are poisonous plants, and should be eradicated from every farm, namely—hemlock, fool's-parsley, henbane, deadly nightshade,

foxglove, monk's hood, buttercups, spurge, cuckoo-pint, bryony, meadow saffron, and meadow anemone. The clippings of yew hedges are dangerous, if eaten by cattle; and even the living branches, if cattle are unused to them.

APPENDIX.

Scientific names of the Plants and Animals mentioned in the foregoing pages, viz.

Plants—Barley, *Hordeum vulgare.*
Bean, *Faba vulgaris.*
Bear-bind, *Calystegia sepium.*
Beet mangel, *Beta macrohiza.*
Bent grass, *Agrostis stolonifera.*
Bindweed, *Convolvulus arvensis,*
Black knapweed, *Centaurea nigra.*
Blue bottle, *Centaurea cyanus.*
Brome grass, *Bromus secalinus.*
Brome rape, *Orobanche major.*

Buck wheat, *Polygonum fagopyrum.*
Burdock, *Arctium lappa*
Cammock, *Ononis spinosa.*
Carrot, *Daucus carrota.*
Cat's-tail grass, *Phleum pratense.*
Charlock, *Sinapis arvensis.*
Cleavers, *Galium aperine.*
Clover, *Trifolium pratense.*
Cock's-foot grass, *Dactylus glomerata.*
Coleseed, *Brassica oleifera.*
Colt's-foot, *Tussilago farfara.*
Corn cockle, *Githago segetum.*
Corn marigold, *Chrysanthemum segetum.*
Couch grass, *Agropyrum repens.*
Cow grass, *Trifolium medium.*
Crowfoot, *Ranunculus repens.*
Crow garlic, *Allium vincula.*
Dandelion, *Leontodon taraxacum.*
Darnel, *Lolium temulentum.*
Dock, *Rumex crispus.*
Dog's-tail grass, *Spartina cynosuroides.*
Fescue grass, *Festuca ovina.*
Fiorin grass, *Agrostis stolonifera.*
Foxtail grass, *Alopecurus agrestis.*
Groundsel, *Senecia vulgarie.*

Hard grass, *Ophiurus incurvatus.*
Knot grass, *Polygonum bistorta.*
Lucerne, *Medicago sativa.*
Mare's-stail, *Equisetum arvensis.*
Melilot clover, *Mililotus officionalis.*
Milfoil, *Achillea millefolium.*
Mint, horse, *Mentha villosa.*
Oat, *Avena sativa*
Oat-grass, *Avena præcox.*
Parsnip, *Pastinaca sativa.*
Patience dock, *Rumex patientia.*
Pea, *Pisum sativa.*
Plantain, *Plantago major.*
Poppy, *Papaver rhœas.*
Potatoe, *Solanum tuberosum.*
Radish, field, *Raphanus raphanistrum.*
Ragwort, *Senecio jacobeæ,*
Rape, *Brassica napus.*
Ray-grass, *Lolium perenne.*
Rest harrow, *Ononis spinosa.*
Rib-grass, *Plantago lanceolata.*
Rye, *Secale cereale.*
Sainfoin, *Onobrychis sativa.*
Selfheal, *Prunella vulgaris.*
Sowthistle, *Sonchus oleraceus.*

Spurrey, *Spergula arvensis.*
Tare, *Vicia sativa.*
Thistle, *Serratula serrata.*
Turnip, *Brassica rapa.*
Wheat, *Triticum hybernum et æstivum.*
Yarrow, *Achillea millefolium.*
Hop, *Humulus lupulus.*
Teazel, *Dipsacus fullonum*

Grasses which are recommended for laying down permanent pasture, namely:—

Cocks'-foot grass, *Dactylis glomerata.*
Meadow fescue, *Festuca pratensis.*
Meadow foxtail, *Alopecurus pratensis.*
Rough-stalked meadow, *Poa trivialis.*
Tall oat-grass, *Holcus avenaceus.*
Meadow cat'stail, *Phleum pratense.*
Hard fescue, *Festuca duriuscula.*
Crested dog'stail *Cynosurus cristatus.*
Nerved meadow grass, *Poa Nervata.*
Wood meadow grass, *Poa nemoralis.*
Narrow-leaved do., *Poa angustifolia.*
Fiorin, *Agrostis stolonifera.*
Ray-grass, *Lolium perenne.*
Dutch clover, *Trifolium repens.*
Bush vetch, *Vicia sepium.*

Vernal grass, *Anthoxanthum odoratum.*

Perennial red-clover, *Trifolium pratense perenne.*

Yarrow, *Achillea millefolium.*

Burnet, *Sanguisorba officionalis.*

Rib grass, *Plantago lanceolata.*

ANIMALS.

Beetles, viz.: —

May-bug or cockchaffer, *Melolontha vulgaris.*

Midsummer or hoary, *Melolontha solstitialis.*

Rose chaffer, *Cetonia aurata.*

Turnip-fly or beetle, *Haltica oleracea.*

Springing-beetle (wire-worm) *Elater castaneus.*

Black-jack caterpillar, *Athalia centifolia.*

Breeze or gadfly, *Oestrus ovis.*

Grey gadfly, *Oestrus ovis.*

Crow, *Corvus corona.*

Polecat, *Mustella putorius.*

Fox, *Canis vulpes.*

Fly (that blows sheep), *Musca Cæsar.*

Goldfinch, *Fringilla carduclis.*

Grey Grub (larva of a moth), *Agrostis segetum.*

Horse *Equus caballus.*

Hog, *Sus scrofa.*

Jackdaw, *Corvus monedula.*

Jay, *Corvus glandarius.*

Lapwing, *Tringa vannellus.*
Magpie, *Corvus pica.*
Mole, *Talpa Europæa.*
Mouse, *Mus musculus.*
Owl, *Strix ulula.*
Ox, *Bos taurus.*
Pigeon (wood,) *Columba palumbus.*
Rabbit, *Lepus cuniculus.*
Rat, *Mus Norvigicus.*
Rook, *Corvus frugilegus.*
Sheep, *Ovis aries.*
Snail, *Helix nemoralis.*
Slug, *Limax agrestis.*
Sparrow (house,) *Fringilla domestica.*
Stoat, *Mustella erminea.*
Tick, *Acarus reduvius.*
Tick (dog,) *Acarus ricinus.*
Turtle dove, *Columba turtur.*
Weazel, *Mustella vulgaris.*
Worms (earth,) *Lumbricus terrestris.*

An Insect, name unknown, which causes the protuberances on the roots and bulbs of all the cabbage family; the swellings are called by the different names of "Clubbing," "Ambury," and "Fingers and Toes."

BOOKS

PUBLISHED BY

RIDGWAY, PICCADILLY.

I.

GROUSE, PARTRIDGE, AND PHEASANT SHOOTING.

Third Edition, post 8vo. 7s. 6d., with Plates.

THE OAKLEIGH SHOOTING CODE.

BY THOMAS OAKLEIGH, ESQ.

Comprising the 180 Canons on Shooting Grouse, Partridges, Pheasants, &c., with numerous explanatory and other Notes.

"We strongly recommend this work."—*Sporting Chronicle.*

"We recommend the volume as one deserving a place in the library with any popular sporting writer."—*Sportsman.*

"Every gentleman, whether young or old, should provide himself with a copy, previous to the ensuing shooting campaign."—*New Sporting Mag.*

"A work indispensable to all Sportsmen. The chapter on the training and proper treatment of dogs is admirable."—*Metropolitan Mag.*

II.

NOW READY,

Illustrated with numerous explanatory Plates, price 6s.

THE PLANTER AND PRUNER'S ASSISTANT.

BY JAMES MAIN, A. L. S., &c. &c.

Giving every possible Instruction for the Planting, Rearing, Pruning and general Management of every kind of Forest Tree; with Practical Hints on the choice of Soil and Situation, &c. &c.

III.

DOMESTIC POULTRY.

Third Edition, greatly improved, and enlarged with Woodcuts of the different Coops, Fattening Houses, Roosting Houses, &c. &c.

A PRACTICAL TREATISE on the BREEDING, REARING, and FATTENING all kinds of DOMESTIC POULTRY, PRESERVATION of EGGS, &c. Dedicated to LORD SOMERVILLE.

By JAMES MAIN, A.L.S. &c. &c.

IV.

ROGERS' FRUIT CULTIVATOR, &c.

Or, a Practical and Accurate Description of the best Species and Varieties of Fruit, with plain Directions for Planting, Training, Forcing, Pruning, &c.

THIRD EDITION, price 6s.

"Directions are given for planting, pruning, training, the formation of Fruit-tree Borders and Orchards; the gathering and storing of Fruit: in a word, everything which can be desired is handled in a plain instructive manner, in such a way as a practical man alone is capable of doing it."—*Irish Farmers' and Gardeners' Mag.*

V.

TO AMATEURS OF FLOWERS.

In 1 vol. price 7s. 6d. coloured, in cloth.

THE FLORIST CULTIVATOR;

Or, Plain Directions for the Management of the principal Florist Flowers, Shrubs, &c., adapted to the Flower Garden, Shrubbery, and Greenhouse; with Select Lists of the finest Roses, Geraniums, Carnations, Pinks, Auriculas, Polyanthuses, Tulips, Dahlias, Heartsease, Cistus or Rock Rose, &c. To which is added the Monthly operation usual for the Flower Garden, Shrubbery, and Greenhonse. The whole arranged on a plan different from any Work hitherto published. By THOMAS WILLATS, Esq. Amateur Cultivator.

VI.

In 8vo. with Plates and Plans, 6s., or 9s. finely coloured.

THE LANDSCAPE GARDENER;

Comprising the History and Principles of tasteful Horticulture. By the Rev. Prebendary DENNIS.

"But taste, like every other quality of the mind, may be nurtured into excellence; and Mr. Dennis has shown himself well qualified for the task of unfolding it, and to use the phrase of the celebrated Landscape Gardener of the last century, with whose name he is familiar—making the most of its *capability.*" —*Horticultural Journal.*

"The present work abounds with original observation, and is well worthy of a place by the side of the most esteemed publications on the principles of Landscape Gardening."—*Horticultural Journal, second notice.*