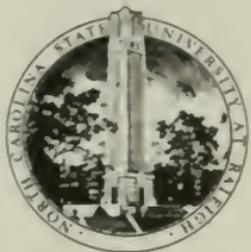




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A
TREATISE
ON
AGRICULTURE
AND
RURAL AFFAIRS.

~~~~~  
BY  
ROBERT BROWN,  
FARMER AT MARKLE, COUNTY OF HADDINGTON.

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*Multum adhuc restat operis, multumque restabit; nec ulli nato post mille sæcula præcluditur occasio aliquid adjiciendi.*—PLINY.

*The poor husbandman who lives honestly, and cultivates his land industriously, is better than a proud philosopher, who neglects himself, and studies the motions of the heavenly bodies.*—THOMAS A KEMPIS.

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EDINBURGH:

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T R E A T I S E
ON
RURAL AFFAIRS.

CHAP. VIII.

CONTINUED.

HAVING in the introductory part of this chapter described landed property as the capital stock of every nation, and detailed in the first section the most approved rotations or modes of cropping practised on the different soils of this Island, it shall now be our business to point out at some length the best methods of raising and bringing to perfection the several crops cultivated by Bri-

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A

tish husbandmen. Considering this as the most important branch of our work, we shall sedulously take care to recommend such practices as have been confirmed by observation and experience. The several processes of rural art may appear simple and plain to unconcerned spectators; but to those connected with agriculture, who have spent their lives in carrying it on, and paid suitable attention to the variable nature of our climate, the business of the cultivator must be regarded as much more complicated and perplexed than that of the manufacturer. In fact, as the business of the husbandman is carried on out of doors, if he is not constantly upon the watch, and minutely attentive to seasons and circumstances, his interest must suffer, and so must that of the nation in a proportional manner.

SECT. II.

On the Cultivation of Culmiferous Crops.

THE species of corn ranked as culmiferous, or robbing ones, are Wheat, Barley, Oats, and

Rye. These we are inclined to consider as bearing equally hard upon the soil; and we think it does not matter much which of them are taken, because all are robbers of the ground, and tend to exhaust it of its productive powers. No doubt some soils are more favourable for one sort of corn than for another; as, for instance, clays and loams are better adapted for wheat than sands and gravels; while, *vice versa*, the latter are better calculated for barley than the heavy soils. It is by fixing upon the most proper of each for the soil cultivated, that the judgment of the farmer is correctly ascertained. In other respects, such as the exhaustion of the ground, we view it as a matter of no importance which of them is preferred.

THE most valuable grain is wheat, and it has been so since the earliest period to which history reaches. This grain now constitutes the chief food of the British nation; and its abundance or scarcity regulates, in a great measure, the welfare and prosperity of the inhabitants. Notwithstanding its manifest utility as a necessary of life, and its importance to the farmer, as being the

the article from which rent in many districts is altogether paid, landed proprietors have, in numerous instances, attempted to interdict its culture, or, at least, they have studiously endeavoured to lessen the quantity cultivated, by restrictions or penalties upon the grower, if a certain stipulated quantity was exceeded in any one year; and more particularly, if that quantity was exceeded in the latter years of a lease. Whether proprietors acting in this way were moved by wise and useful reasons, needs no inquiry; because it is evident, that the greater the value of produce raised upon a farm, so much more rent is the farmer enabled to pay the proprietor; and though this increased rent may be delayed for a few years, namely, to the end of the current lease, the proprietor is sure to obtain it at that period. Proprietors, however, have hitherto thought differently; and their errors have been sanctioned by the courts of law, who have not been slow in punishing farmers, considered by them as deviators from the rules of good husbandry. Notwithstanding the impediments in the way, both legal and conventional, the culture of wheat has of late prodigiously increased, and now constitutes a prominent branch of Bri-

tish husbandry. Landed proprietors, it is believed, are now almost satisfied, that the growth of this grain does not deteriorate or waste their lands, though formerly not a few of them thought that the vegetative powers of their estates might be sold in the public market in the shape of wheat,—an idea handed down from father to son for successive generations, though now in some measure renounced and abandoned.

As wheat is the most valuable grain cultivated in the British isles, we shall treat of the several processes connected with its culture in a more particular manner than may afterwards be required, when other grains occupy our attention. We shall first speak of the soils best adapted to the growth of wheat ; 2. Of the culture required for that grain ; 3. Of the varieties of seed ; 4. Of the way in which it is sown ; 5. Of pickling the seed, so as the crop may be preserved from being smutted or blacked ; 6. Of the diseases to which wheat is liable in different stages 7. Of harvest management ; 8. Of thrashing the grain, and preparing it for market.

1. *ON the Soils best adapted to the Growth of Wheat.*—Rich clays and heavy loams are naturally well calculated for producing wheat ; but any kind of clay and loamy soil, situated in a proper climate, may be artificially adapted to the growth of that grain, by enriching it with a sufficient quantity of manure. On soils of the first description, wheat may be cultivated almost every second year, provided due care is taken to keep the land clean, and in good condition. A summer fallow once in four, six, or eight years, according to seasons and circumstances, is, however, necessary ; and manure should either be applied on that fallow for the first crop of wheat, or, what some people think preferable, should be laid on the wheat stubble for a crop of drilled beans, which ensures the succeeding crop of wheat. If the first crop of beans has been completely cleaned, there is no difficulty of repeating, and even of extending the course ; and the crops will be little inferior to those gained at the beginning of the rotation, provided manure has been bestowed to each crop of beans. In this way, when the ground is fallowed every fourth year, two crops of wheat and one of beans are gained from manuring once ; when fallowed

every sixth year, three crops of wheat and two of beans are gained from manuring twice; and, when fallowed every eighth year, four crops of wheat, and three of beans, from manuring thrice. In the first mentioned shift, less manure is bestowed than in any of the other two; and if the soil is of good quality it will support itself; whereas, in the shifts of six and eight, unless foreign manure is procured, it rarely happens that they can go on successfully for any length of time, without abstracting dung from other parts of the farm on which they are practised.

WITH regard to thin clays, the shifts mentioned above are inapplicable. A six-course shift of a different kind has, however, been successfully followed by many people; but it requires every branch of the work to be well executed.

1. A summer fallow, dunged at the rate of 12 or 14 double loads per acre;
2. Wheat;
3. Grass;
4. Oats;
5. Pease and Beans drilled;
6. Wheat.

If manure can be given in the middle of the shift, every one of the crops may be expected good; but if that is withheld, there will necessarily be a proportional falling off in

the two last crops. Husbandmen must, however, regulate their practice according to their means; though it deserves to be remarked, that, if greater attention were paid to the collecting of materials, which are ultimately convertible into manure, many deficiencies in that article would be fully supplied.

LIGHT soils, though they will, with the exception of soft sands, produce wheat of excellent quality, are not constitutionally disposed to the growth of that grain; nor will they, under any management, bear such a frequent repetition of it as those already mentioned. Summer fallow on them may safely be dispensed with; because a crop of turnips, which admits every branch of the cleaning process to be more perfectly executed than even a naked or bare fallow does, may be profitably substituted. Wheat here comes in with propriety after turnips; though, in general cases, it must be sown in the spring months, unless the turnips are stored; in which case, it may be sown in November; or it may be sown after clover, for the fourth crop of the rotation; or in the sixth year, as a way-going crop, after drilled peas and beans, if the rotation is extended

to that length. But, take it any way, it is scarcely possible to raise wheat so extensively upon light soils, even where they are of the richest quality, as is practicable upon clays ; nor will a crop of equal bulk upon the one return so much produce in grain as may be got from the other. To enlarge upon this point would only serve to prove, what few husbandmen will dispute, though it may be added, that, on real sands, wheat ought not to be ventured, unless they are either completely clayed or marled, as it is only with the help of these auxiliaries that such a soil can gain stamina capable of producing wheat with any degree of success.

2. *On the Culture required for Wheat.*—On soils really calculated for wheat, though in different degrees, summer fallow is the first and leading step for gaining a good crop or crops of that grain. The first furrow should be given before winter, or so early as other operations upon the farm will admit ; and every attention should be used to go as deep as possible ; for it rarely happens that any of the succeeding furrows exceed the first one in that respect. The number of after ploughings must be regulated by the con-

dition of the ground and the state of the weather ; but, in general, it may be observed, that ploughing in length and across alternately is the way by which the ground will be most completely cut, and the intention of fallowing best accomplished. It has been argued, that harrowing clay soils, when summer fallowed, is prejudicial to the wheat crop ; but, without discussing this point (such a discussion being unnecessary), it may merely be stated that, in a dry season, it is almost impracticable to reduce real clays, or to work them too small ; and that, even in a wet one, supposing they are made surface smooth, they will, when ploughed up again, consolidate into clods or big lumps, after forty-eight hours drought, and become nearly as obdurate as ever. It is only on thin soils, which have a mixture of peat-earth, and are incumbent on a bottom impervious to water, that damage is at any time sustained from over-harrowing. Such are generally of a weak texture, and may be broken down with facility by the roller and harrow. If caught by much rain before the pores are in some measure closed, the moisture is greedily absorbed ; and being prevented from going downwards, by the hardness of the subsoil, the whole surface be-

comes a kind of mortar or paste, unless previously well-ridged up, which, to a certain extent, prevents the consequences from being dangerous. These evils, however, must be submitted to by the possessors of such soils, if they want to have them sufficiently fallowed and prepared in a proper manner ; for, without reducing them, couch-grass, and especially *moor fog*, with which they are commonly stored, cannot be eradicated. If they are reduced in the early part of the season ; the danger is small ; but to break them down in the latter part ought always to be avoided, unless called for by imperious necessity.

SOME people think it improper to dung rich clays or loams when fallowed, and choose rather to reserve that restorative till the succeeding season, when they are prepared for a crop of drilled beans. Delaying the manuring process for a year is attended with many advantages ; because good land, fully wrought, contains such a principle of action within itself as often causes the first wheat crop to be lodged before it is filled ; under which circumstance, the produce is diminished both in quantity and quality. This delay in manuring is, however, attended with disadvantages ;

because, when dung is kept back till the end of autumn or beginning of winter, to be laid on the stubbles, the weather is often so wet that it cannot be carted out without subjecting the land to injury from poaching, whilst the labour in laying it on is also increased. On thin clays, or even upon soils of the other description not in high condition, there can be no doubt but that the end of summer, and upon summer fallow, is the most proper time for manuring them, though an improvident expenditure of dung, on such occasions, ought always to be steadily avoided.

WHEN wheat is sown after beans, it rarely happens, in this northern climate, that more than one ploughing can successfully be bestowed. Before this is given, it is advantageous to cross-harrow the land, which levels the drills, and permits the ploughing process to be executed with precision. Almost in every case, the ridges should be gathered up, so that the furrows may be well cleared out, and the plants preserved from injury during the inclement winter season. Cloverland should be neatly ploughed and well laid over, so that the roots of the grasses may be buried and destroyed; for it frequently happens,

that crops of wheat, after clover and rye-grass, are greatly injured by inattention to the ploughing process. In short, sowing wheat after clover may be considered as the most hazardous way in which that grain can be cultivated.

3. *On the Varieties of Seed.*—Wheat may be classed under two principal divisions, though each of these admits of several subdivisions. The first is composed of all the varieties of red wheat; but, as such are now rarely sown in North Britain, being at least 15 per cent. inferior in value to those which are generally cultivated, it is unnecessary to say any thing about them. The second division comprehends the whole varieties of white wheat, which again may be arranged under two distinct heads, namely, *thick chaffed* and *thin chaffed*. The thick chaffed varieties were formerly in greatest repute, generally yielding the whitest and finest flour, and, in dry seasons, not inferior in produce to the other; but, since 1799, when the disease called mildew, to which they are constitutionally predisposed, raged so extensively, they have gradually been going out of fashion, at least in North Britain; and, for two years past, a field of thick chaffed wheat has

scarcely been seen in any of the wheat districts. Under these circumstances, it seems unnecessary to notice them more particularly.

THE thin chaffed wheats are a hardy class, and seldom mildewed, unless the weather be particularly inimical during the stages of blossoming, filling, and ripening, though some of them are rather better qualified to resist that destructive disorder than others. In 1799, few thin chaffed wheats were seriously injured; and instances were not wanting to shew, that an acre of them, with respect to value, exceeded an acre of thick chaffed wheat, quantity and quality considered, not less than 50l. per cent. Since that time, therefore, their culture has rapidly increased; and to this circumstance may, in a great measure, be attributed the high character which thin chaffed wheats now bear. A nomenclature of thin chaffed wheats might be useful; but, at present, any thing of that nature is an impossible task; because, even with agriculturalists, their names are altogether arbitrary. It is sufficient to say, that the best variety now known is one selected and reared by William Hunter, Esq; of Tynfield, in East Lothian, which, for sound-

ness of constitution, and prolificness of produce, exceeds any other with which we are acquainted. Perhaps the prettiest sample is not afforded by this variety; but millers and bakers are now satisfied, that the whitest and fairest wheats, externally, are not those which are most productive of the best flour. It has been often noticed, that this wheat preserves a green healthy aspect during the coldest weather, when other varieties assume a sickly and jaundiced hue. The resistance which it shews to the effects of inclement weather, perhaps, proceeds from the strength of its roots, though the effect may be easier described than the cause accounted for.

A variety of wheat (*Triticum Estivum*), which may be sown so late as the end of April, has been lately much recommended by Sir John Sinclair, Bart. and other agriculturalists, though its real merits have not hitherto been sufficiently ascertained. Should future trials justify the culture of this grain, it may be sown with much propriety upon the turnip lands, from which the crop is rarely removed sooner than the above period, especially as the culture of barley is now greatly discouraged by statutory enactments. If

we are not mistaken, wheat of the same kind was cultivated by a few people in this country more than thirty years ago, and given up because the millers and bakers were not fond of the flour produced from it.

4. *On Seed-Work.*—Sowing in the broad-cast way may be said to be the mode universally practised in North Britain; for the trifling deviations from it can hardly be admitted as an exception. Upon well prepared lands, if the seed be distributed equally, it can scarcely be sown too thin; perhaps two bushels per acre are sufficient; for the heaviest crops at autumn are rarely those which shew the most vigorous appearance through the winter months. Bean stubbles require more seed than summer fallows; because the roughness of their surface prevents such an equal distribution; and clover lees ought to be still thicker sown than bean stubbles. Thin sowing in spring ought not to be practised, otherwise the crop will be late, and imperfectly ripened. No more harrowing should be given to fields that have been fallowed than what is necessary to cover the seed, and level the surface sufficiently. Ground which is to lie in a broken down state

through the winter suffers severely when an excessive harrowing is given, especially if it is incumbent on a close bottom; though, as to the quantity necessary, none can give an opinion, except those who are personally present.

5. *On Pickling the Seed.*—This process is indispensably necessary on every soil; otherwise smut, to a greater or less extent, will, in nine cases out of ten, assuredly follow. Though almost all practical farmers are agreed as to the necessity of pickling, yet they are not so unanimous as to the *modus operandi* of the process, and the article which is best calculated to answer the intended purpose. Stale urine may be considered as the safest and surest pickle; and, where it can be obtained in a sufficient quantity, is commonly resorted to. The mode of using it does not, however, seem to be agreed upon; for, while one party contends that the grain ought to be steeped in the urine, another party considers it as sufficient to sprinkle the urine upon it. Some, again, are advocates for a pickle made of salt and water, sufficiently strong to buoy up an egg, in which the grain is to be thoroughly steeped. But, whatever difference of opinion there may be

as to the kind of pickle that ought to be used, and the mode of using it, all admit the utility of mixing the wetted seed with hot lime fresh slaked; and this, in one point of view, is absolutely necessary, so that the seed may be equally distributed. It may be remarked, that experience justifies the utility of all these modes, provided they are attentively carried into execution. There is some danger from the first; for, if the seed steeped in urine is not immediately sown, it will infallibly lose its vegetative power. The second, viz. sprinkling the urine on the seed, seems to be the safest, if performed by an attentive hand; whilst the last may do equally well, if such a quantity of salt be incorporated with the water as to render it of sufficient strength. It may also be remarked, that this last mode is oftener accompanied with smut, owing, no doubt, to a deficiency of strength in the pickle; whereas a single head with smut is rarely discovered when urine has been used.

6. *Diseases of Wheat.*—Wheat is subject to more diseases than other grains, and in some seasons, especially in wet ones, heavier losses are sustained from those diseases, than are felt in the

culture of any other culmiferous crop with which we are acquainted. Wheat may suffer from the attack of insects at the root ; from blight, which primarily affects the leaf or straw, and ultimately deprives the grain of sufficient nourishment ; from mildew on the ear, which operates thereon with the force of an apoplectic stroke ; and from gum of different shades, which lodges on the chaff or cups in which the grain is deposited. Theorists often neglect these distinctions, or confound the different disorders to which this valuable grain is exposed ; but the practical farmer, who sedulously examines his crop in every stage of its growth, will not readily fall into such errors.

It has, without inquiry, been taken for granted by some people, that blight, mildew, and rust, are the same disorder, though most agriculturists have hitherto reckoned them separate diseases, brought on at different periods, and occasioned by different causes. It may be laid down as a primary principle, that the proximate cause of every disease which attacks the stalk and ear of wheat plants may be found in the state of the weather at the time, conjoined with the circumstances of soil, situation, and the seed that has

been used. It is difficult to classify these diseases, or describe them in a distinct manner; because the sentiments, or rather the language, of agriculturists on this subject is arbitrary and indistinct. Notwithstanding that they are, by the great body of farmers, attributed to atmospherical influence solely, yet much confusion arises in their nomenclature; for many people use the terms of *blight*, *mildew*, and *rust*, as synonymous, though to us they appear to be distinct diseases.

BLIGHT, according to our ideas, originates from moist or foggy weather, and from hoarfrost; the effects of which, when expelled by a hot sun, are first discernible on the straw, and afterwards on the ear, in a greater or lesser degree, according to local circumstances. Let a field be examined in a day or two after such weather, and a careful observer will soon be satisfied, that the fibres and leaves of the plants are contracted and enfeebled in consequence of what may be called a stoppage of perspiration. This disorder may take place either earlier or later, but is most fatal when it appears at the time the grain is forming in the ear. It may appear at an earlier stage; and though the productive powers of the plant

will thereby be lessened, yet, if circumstances are afterwards favourable, the quality of the grain produced may not be much impaired ; or it may appear after the grain is fully formed, and then very little damage will be sustained, except by the straw.

MILDREW, again, strictly speaking, may be ranked as a disease which affects the ear, and is brought on by causes somewhat similar to those which occasion blight, though at a more advanced period of the season. If this disorder comes on immediately after the first appearance of the ear, the straw will also be affected ; but if the grain is nearly or fully formed, then injury on the straw is not much discernible. We have seen a crop which carried wheat that was mildewed, where the straw was perfectly fresh, though, indeed, this rarely happens. A severe mildew, however, effectually prevents both corn and straw from making any further progress, the whole plant apparently going backward every day, till existence, in a manner, ceases altogether. Something akin to mildew is the gum or red oaker, which, in all warm moist seasons, attaches itself to the ear, and often occasions considerable

damage. All these different disorders are generally accompanied by insects ; which animalculæ, by many people who take the effect for the cause, are considered, though without the least foundation; as the authors of the mischief that follows. Their appearance, however, may justly be attributed to the diseased state of the plant; for, wherever putrefaction takes place, either in animal or vegetable substances, the presence of these insects will never be wanting.

ANOTHER disorder which affects wheat, and by several people denominated the rural rust, is brought on by excessive heats, which occasion the plants to suffer from a privation of nourishment, and become sickly and feeble. In this atrophical state, a kind of dust gathers on the stalk and leaves, which increases with the disease, till the plant is in a great measure worn out and exhausted. The only remedy in this case, and it is one that cannot easily be administered by the hand of man, is a plentiful supply of moisture, by which, if it is received, before consumption is too far advanced, the crop is benefited in a degree proportional to the extent of nourishment received, and the stage at which the disease

has arrived. We have reason to believe that rust is less frequently discerned in Scotland than in England, because our summers are neither so warm nor so early as those of our southern neighbours. Neither is blight very prevalent in this northern climate. Mildew, in fact, is the disorder which Scottish agriculturists have most to dread, and the only preventive is the use of thin-chaffed wheats; these, even in the worst seasons, being only partially injured.

THERE is not the slightest reason to believe that parasitical animalculæ are the agents of these diseases, because the whole of them may be imputed to atmospherical influence; yet it is not easily ascertained whether excessive drought or excessive rains are most pernicious. Perhaps both may have an influence, as the plant, being stunted and debilitated by the drought, in the first instance, is afterwards unable to bear up and flourish when visited with heavy rains, especially if these set in at a period when the crop is in a critical stage. This conclusion will, without difficulty, be admitted by every farmer much concerned in the growing of wheat, who has attentively observed his crops in the various stages of

their growth, and compared the extent of produce in different years, with the weather when the filling and ripening processes were going forward.

WHETHER blight and mildew are considered separately, or viewed as one and the same disorder, appearing at different periods of the plant's growth, we are convinced that both may with truth be reckoned to proceed from an unhealthy atmosphere, when the crop is in certain stages of its progress to maturity. Every farmer is satisfied that, not only the extent, but the very appearance of blight and mildew, are entirely governed by the seasons; and that, with respect to wheat, the kind sown, namely, whether thin or thick chaffed, has a very considerable effect in lessening or increasing the effects of these baneful disorders; and that even soil, culture, and situation, have each their respective influence. It rarely occurs that either blight or mildew are felt in dry warm seasons, except in close confined fields, where the evening dews stagnate, and remain till they are removed by the meridian sun. Hence the wheat crops, in such situations, seldom or never escape a partial or general injury.

On the other hand, in every moist season, whether cold or warm, blight, mildew, and gum, on the ear, are experienced in a greater or lesser degree. In such seasons, thin-chaffed wheats are much less injured than those that are thick-chaffed; which circumstance is in direct opposition to the doctrine, that blight, mildew, and rust, are brought on by parasitical plants or fungi. Among many others in our power to state, a convincing instance occurred in that fatal year 1799, when few fields escaped mildew of the worst kind. On a field carrying both kinds, sowed in one day, and harvested in like manner, we had not only one-third more produce from the part which carried thin-chaffed grain, but actually sold it two shillings and sixpence per bushel higher in the public market than the other would fetch. Soil, culture, and situation, have, in an inferior degree, an influence in the growth and progress of diseases. Some soils are naturally so moist at bottom, that dampness issues from them at all times. Superior culture, and excessive manuring, are apt to cause a crop to be early lodged; in which case, one disease or other is sure to seize upon it; and a southern aspect, and every confined situation, are much more hazardous than those of a north-

ern or western exposure, and where the air has free egress. In a word, when hoar-frost or vapour of any kind is dispelled by wind, no danger will follow to the crop; but, where a hot sun is the agent, we have repeatedly noticed the most serious losses.

THE opinions already expressed, respecting the diseases of wheat, receive considerable support from what happened with crops 1808 and 1809. That mildew acted, in numerous instances, as the destroying agent of crop 1808, is universally acknowledged; but that the defectiveness of that crop was entirely owing to mildew, may safely be questioned. In fact, the chief injury proceeded from an unhealthy or pestilential atmosphere, at the time when the grain was in an embryo or imperfect state. Owing to that unhealthiness, something like abortion seemed to take place in the parent plant, after the fœtus of the young-grain was formed, as was evident from more than one half of the cups, or vessels, prepared by nature for its reception, being totally void of substance, notwithstanding that every part of the ear had blossomed equally well, and promised to furnish a numerous and healthy pro-

geny. Even the grain which remained in life, proved afterwards to be of perfect or imperfect quality, according to the nature, situation, and condition of the soil upon which it was produced. Upon sound healthy soils, where the plants were provided with strong seminal and coronal roots, the grain was more deficient in quantity, than defective in quality. In situations where abortion did not take place in the first instance, the young grain, from receiving a regular supply of food, was enabled to resist the storms which beat upon and destroyed its weaker and worse supplied neighbours. As happens with persons of sound constitutions, disease was successfully resisted in many instances; and though the healthiest plants had fewer grains in their ears than usual, being constantly defective in the upper part of the ear, yet these grains which remained in life were ripened and harvested, after passing through the process of maturation, in the most satisfactory manner.

It shall now be inquired, how this abortion was brought about, which we have stated as so destructive to the wheat crop of 1808. This may be satisfactorily elucidated by a reference to

the weather, which prevailed through the months of July and August, as it is in these months that the diseases of wheat always appear, that of smut excepted, which is not generated by an unhealthy atmosphere.

THE month of July was excessively warm, more so than remembered by the oldest man living; and from the beginning to the 20th of the month, the slightest moisture, even in the mornings and evenings, was not perceivable. Owing to this uncommon heat, wheat plants upon all soils not composed of clay or strong loam, were, in a manner, at a stand with respect to growth, being enfeebled by the fierce rays of the sun, while any wind that blew was so sultry, that the evil was rather increased by its effects. The ground, in consequence of this intense sunshine, felt something like burnt-brick when taken from the kiln; of course, when the rains fell, smoke issued from the surface, something like what proceeds from lime-shells when water is thrown upon them; and this exhalation of vapour continued in a greater or lesser degree, till the soil was completely saturated with moisture, when the air became cooler and more temperate.

UNDER these circumstances it was not to be expected the wheat crop could escape from the danger with which it was encompassed. Apprehensions, therefore, were entertained, that the fields, already in a sickly and declining state, would soon fall victims to the pestilence which raged in the atmosphere; and the result soon shewed that these apprehensions were too well founded. With the exception of the lands upon the sea-shore, preserved, we presume, by refreshing breezes from the sea, every field was discovered to be more or less injured. Those soils composed of sand, soft loam, and thin clays, mixed with peat earth, were almost, in every case, attacked by mildew, while the healthier and sounder soils, where mildew was rarely discernible, suffered considerably by having the young grain destroyed in the cup, and, of course, yielded crops generally one-third or one-fourth short of the usual produce. Had not thin or smooth chaffed wheats been generally sown, it is almost certain, that a single field would not have escaped mildew. We know of no fields sown with the thick chaffed, or woolly eared varieties, that escaped mildew in its most aggravated shape. Even the smoothed chaffed varieties depend for

safety entirely upon the nature of the soil which they occupied, and their condition at the time when rainy weather commenced.

HERE it may be remarked, that though mildew is a disease altogether unknown during dry weather. yet it is only in seasons when the weather has been very warm and dry that its effects are most strikingly displayed. In such seasons, rust often appears upon the straw of wheat, produced upon dry and light soils, and upon all soils which have not good stamina, brought on, it would seem, by the plants being stunted of nourishment. Now, if humid weather sets in when the plants are in this atrophical state, and continues for any length of time, the disease called mildew, which completely checks the circulation of the plant, immediately follows, as was produced last season in numberless instances. In a word, had we been at the West Indies at the time, and learned that the weather from 24th July to 13th August 1807, was almost incessantly wet, we at once would have predicted that the wheat crop would be a failing one; and on the truth of that prediction would have confidently relied, because similar ones, in the course

of a pretty lengthened experience, had invariably been verified by the produce of wheat crops so circumstanced.

SOME people have recommended the sowing of blighted and mildewed wheat, because it will vegetate; though certainly the recommendation, if carried into practice, would be attended with imminent danger to those who attempted it. That light or defective wheat will vegetate and produce a plant, we are not disposed to contradict; but that it will vegetate as briskly, or put out a stem of equal strength, and capable of withstanding the severe winter blasts, as those produced from sound seed, we must be excused for not believing. Let it only be considered, that a plant of young wheat, unless when very early sown, lives three or four months, in a great measure, upon the nourishment which it derives from the parent seed; and that such nourishment can, in no view of the subject, be so great, when the parent is lean and emaciated, as when sound, healthy, and vigorous. Let it also be remembered, that a plant produced from the best, and weightiest seed, must, in every case, under a parity of other circumstances, have a stronger constitution

at the outset, which necessarily qualifies it to push on with greater energy when the season of growth arrives. Indeed, the economy of nature would be overturned had any other result followed. A breeder of cattle or sheep would not act more foolishly, who trusted that a deformed diminutive bull or ram would produce him good stock, than the corn farmer does who uses unsound or imperfect seed. Without reasoning, however, on these matters, it may be stated, that we have seen fields which were partly sown with sound, partly with mildewed seed, and the difference was discernible at one glance through the whole winter months.

We have in substance admitted, that mildewed seed will vegetate, though, in one instance, we remember of a field sown with such seed, where three-fourths of the grain at least lay altogether dormant; but we contend, even under the above admission, that such seed ought not to be trusted, since it furnishes plants unable to withstand the severe blasts of winter and spring. It is well known that, in some seasons, even the strongest rooted wheat suffers severely; and there is no doubt but that the weak and feeble.

plants always perish first. But what may be expected when the whole plants are weak and debilitated, as necessarily must be the case with those produced from light grain, till the coronal roots are formed, and able to search for food? When that period arrives, perhaps, the battle is in a great measure won; but how many thousands may be slain before that stage is reached. That there is a danger from weak seed, and not a small one, we presume will not be disputed; and that the farmer who exposes himself to such a danger does not act wisely, requires no demonstration.

BUT another reason operates with us against the use of mildewed wheat, which at least deserves consideration:—Is there not some risk that the disease may be conveyed from the parent to the crop, and that the produce may thereby be lessened? We do not go so far as to say, that this disease, like smut, begets its like, though there is a degree of risk in the use of mildewed seed, which no prudent farmer would chuse to hazard, who could avoid it. On this point, we

have the respectable support of Sir John Sinclair, Baronet, who, in an address to the members of the Board of Agriculture, September 1795, says, "Every exertion ought to be made to secure an abundant supply of wheat; and, for the purpose of effecting so desirable an object, it is essentially necessary that none but the best seed should be made use of. In some parts of the kingdom, particularly in Yorkshire, the mildew has been much complained of. *Any seed infected with that disorder ought to be avoided as much as possible, and untainted seed, at any expence, ought to be procured.*" Sir John, in this advice, displays a correctness of opinion, which we trust will never be lost sight of by the farmers of Great Britain.

7. *On Harvest Management.*—It is advantageous to cut wheat before it is fully ripe; but in ascertaining the proper state, it is necessary to discriminate betwixt the ripeness of the straw and the ripeness of the grain; for, in some seasons, the straw dies upwards; under which circumstance, a field, to the eye, may appear to be completely fit for the sickle, when, in reality, the grain is imperfectly consolidated, and perhaps

not much removed from a milky state. Though it is obvious that, under such circumstances, no farther benefit can be conveyed from the root, and that nourishment is withheld the moment that the roots die; yet it does not follow, that grain so circumstanced should be immediately cut; because, after that operation is performed, it is in a great measure necessarily deprived of every benefit from the sun and air, both of which have greater influence in bringing it to maturity, so long as it remains on foot, than when cut down, whether laid on the ground, or bound up in sheaves. The state of the weather at the time also deserves notice; for, in moist, or even variable weather, every kind of grain, when cut prematurely, is more exposed to damage than when completely ripened. All these things will be studied by the skilful husbandman, who will also take into consideration the dangers which may follow, were he to permit his wheat crop to remain uncut till completely ripened. The danger from wind will not be lost sight of, especially if the season of the equinox approaches; even the quantity dropped in the field, and in the stackyard, when wheat is over ripe, is an object of consideration. Taking all these things into

view, it seems prudent to have wheat cut before it is fully ripe, as less damage will be sustained from acting in this way than by adopting a contrary practice.

IF the weather be dry, and the straw clean, wheat may be carted to the stack-yard in a few days ; indeed, if quite ripe, it may be stacked immediately from the sickle, especially when not meant for early thrashing. So long, however, as any moisture remains in the straw, the field will be found to be the best stack-yard ; and where grass or weeds of any kind are mixed with the crop, patience must be exerted till they are decayed and dried, lest heating be occasioned ; which, independent of the loss, is to the farmer a most disgraceful affair.

8. *On Thrashing Wheat.*—Before thrashing machines were introduced, the task of separating wheat from the straw was arduous and difficult. The expence was considerable, whilst the severity of the labour almost exceeded the power of the strongest man, especially in unfavourable seasons, when the grain adhered pertinaciously to the ear, and could not, without difficulty, be completely

loosened and removed. In such seasons, expence was the smallest consideration which influenced the husbandman ; it was the quantity of grain unavoidably lost which occupied his attention ; and, as it appeared difficult to find out a remedy, most people considered it as an evil which could scarcely be avoided. In short, the loss was great in almost every case, but greater with wheat than any other grain. Every thing of this nature, however, may be prevented, now that thrashing machines are introduced, provided the feeder is careful, and proportions the quantity on the board to the strength of the impelling power. Wheat, in fact, is now the cleanest thrashed grain ; because the length of the straw allows it to be properly beat out before it passes the machine, which sometimes is not the case with short oats and barley. If horses are used as the impelling power, thin feeding is necessary, otherwise the animals may be injured ; but, where wind or water is employed, the business of thrashing is executed speedily, completely, and economically.

THE late Benjamin Bell, Esq; of Hunthill, made various experiments, to ascertain whether

light or imperfect seed would vegetate and produce a crop equal to what might be obtained from seed perfectly ripened and safely harvested. The result of these experiments strongly confirm what we have urged with respect to the use of mildewed or diseased grain for seed ; and, had it not been rather inconsistent with the nature of this work, we would have extracted from his statement the whole particulars connected with the subject under consideration.

WE may only mention, that Dr Bell, in October 1783, sowed a field of twelve acres with nine bolls of wheat, of which an English quarter, or something less than two bolls, was the best that could be procured in the London market of crop 1783. Five bolls of the produce of East Lothian crop 1783 was also used, and one boll of the best wheat in the London market of crop 1782 ; and one boll of the produce of wheat near Edinburgh, in the same year, made out the total quantity. Here it must be remarked, that 1782 was a season generally unfavourable to raising wheat in perfection, but that in 1783 that grain was sound, and of excellent quality.

THE field upon which the above parcels of wheat was sown was well fallowed, and equally manured with dung, and the whole seeds were sown in the beginning of October, after each of them had been washed in strong brine, and afterwards dried with new slaked lime.

THE English seed of crop 1783 was sown on one side of the field, and half a boll of the Mid-Lothian seed of crop 1782 on three ridges next to it. To this succeeded the English wheat of the same crop; then the East Lothian wheat, and next to it the other half boll of Mid Lothian wheat of 1782.

THE field being all in good condition, the wheat appeared early above the surface, and the shoots were every where strong, excepting on those ridges sown with Mid Lothian wheat of crop 1782, on which the plants were weak, and not very numerous. Neither did they spread or tiller like the others; so that, during the winter and spring months, the wheat on these ridges had a weak appearance, and in harvest the straw was not only thin and of little length, but the ears were short and small, and the grain

on this part of the field was not so large or heavy as on other parts.

It was also found, on being thrashed and measured, that the produce of the wheat of crop 1782 was only eleven bolls, or five and a half for one ; whereas the produce of the rest of the field was fully fifteen for every boll of seed sown. The difference in value was also considerable, the produce of the Mid Lothian wheat selling five shillings per boll lower than the others.

FROM the above statement, a powerful motive occurs for using only the best corn for seed, the truth of which cannot be too strongly inculcated. Indeed, we have always considered the doctrine broached by Sir Joseph Banks, Bart. some years ago, as inimical to the true interests of agriculture. That light or imperfect seed will vegetate and send forth a stalk or plant may easily be admitted ; but that the produce of that stalk or plant will be so healthy or great as what may be obtained from plump well filled seed, will scarcely be questioned by any one who is not a slave to system. Very great pains have been used by British breeders to procreate animals from the best

and most approved kinds of cattle and sheep ; but, were it admitted that light, diseased, and imperfect grain, was capable of making an equal return to the grower, quantity and quality being taken into consideration, it is plain that the breeders of live-stock are demonstrably wrong in selecting the strongest and best proportioned animals as the basis of their breeding stock. In making these selections, however, every man will acknowledge that they acted with judgment ; therefore it necessarily follows, that the growers of corn, who make use of defective grain for seeding their fields, neither consult their own interest, nor act with that degree of judgment and understanding which ought to influence and govern every good husbandman.

On Barley.

NEXT to wheat, the most valuable grain is barley, especially on light and sharp soils. This grain, however, is less cultivated than in former times ; because the immense taxation on it, when made into malt, in the first instance, and afterwards when brewed or distilled into ale or spirits, has contributed to decrease the demand, and

consequently to diminish the value of the article. Another reason for its decreased culture may be assigned, namely, that the quantity used as bread-corn is now very trifling. These circumstances conjoined, have, for several years, rendered the cultivation of barley, unless in situations extremely favourable, of less advantage to the farmer than any other grain.

Besides, barley is a tender grain, and easily hurt in any of the stages of its growth, particularly at seed time; a heavy shower of rain will then almost ruin a crop on the best prepared land; and, in all the after processes, greater pains and attention are required to insure success than in the case of other grains. The harvest process is difficult, and often attended with danger; even the thrashing of it is not easily executed with machines, because the awn generally adheres to the grain, and renders separation from the straw a troublesome task. Barley, in fact, is raised at a greater expence than wheat, and, generally speaking, is a more hazardous crop. Except upon rich and genial soils, where climate will allow wheat to be perfectly reared, it ought not to be cultivated.

BARLEY may be divided into two sorts, early and late ; to which may be added a bastard variety, called bear or bigg, which affords similar nutriment or substance, though of inferior quality. Early barley, under various names, was formerly sown in Britain upon lands that had been previously summer-fallowed, or were in high condition ; but this mode of culture being in a great measure renounced, the common sort, which admits of being sown early or late, is now generally used. The most proper seed-season is any time in April, though we have seen good crops produced, the seed of which was sown at a much later period. Bear or bigg may be sown still later than common barley, because it ripens with greater rapidity. But, as a general principle, where land is in order, early sowing, of every variety, is most desirable.

Preparation.—Barley is chiefly taken after turnips, sometimes after peas and beans, but rarely, by good farmers, either after wheat or oats, unless under special circumstances. When sown after turnips, it is generally taken with one furrow, which is given as fast as the turnips are consumed, the ground thus receiving much benefit from the spring frosts. But often two or more

furrows are necessary for the fields last consumed ; because, when a spring drought sets in, the surface, from being poached by the removal or consumption of the crop, gets so hardened as to render a greater quantity of ploughing, harrowing, and rolling necessary, than would otherwise be called for. When sown after beans and peas, one winter and one spring ploughing are usually bestowed ; but, when after wheat or oats, three ploughings are necessary, so that the ground may be put in proper condition. These operations are very ticklish in a wet and backward season ; and rarely, in that case, is the grower paid for the expence of his labour. Where land is in such a situation as to require three ploughings before it can be seeded with barley, it is better to summer-fallow it at once, than to run the risks which seldom fail to accompany a quantity of spring labour. If the weather be dry, moisture is lost during the different processes, and an imperfect braird necessarily follows. If it be wet, the benefit of ploughing is lost, and all the evils of a wet seed-time are sustained by the future crop.

Quantity of Seed.—The quantity sown is different in different cases, according to the quality

of the soil, and other circumstances. Upon very rich lands, eight pecks per acre are sometimes sown ; twelve is very common ; and, upon poor land, more is sometimes given. Among the best farmers, it seems a disputed point, whether the practice of giving so small a quantity of seed to the best lands is advantageous. That there is a saving of grain there can be no doubt ; and that the bulk may be as great as if more seed had been sown, there can be as little question. Little argument, however, is necessary to prove, that thin sowing of barley must be attended with considerable disadvantage ; for, if the early part of the season be dry, the plants will not only be stinted in their growth, but will not send out offsets ; and, if rain afterwards fall, an occurrence that must take place some time during the summer, often at a late period of it, the plants will then begin to stool, and send out a number of young shoots. These young shoots, unless under very favourable circumstances, cannot be expected to arrive at maturity ; or, if their ripening is waited for, there will be a great risk of losing the early part of the crop, a circumstance that frequently happens. In almost every instance, an unequal sample is produced, and the grain is for

the most part of inferior quality. By good judges, it is thought preferable to sow a quantity of seed sufficient to insure a full crop, without depending on its sending out offsets. Indeed, where that is done, few offsets are produced, the crop grows and ripens equally, and the grain is uniformly good.

Harvesting.—More care is required in the harvesting of barley, than of any other white crop, even in the best of seasons ; and in bad years it is often found very difficult to save it. Owing to the brittleness of the straw, after it has reached a certain period, it must be cut down ; as, when it is suffered to stand longer, much loss is sustained by the breaking of the heads. On that account it is cut at a time when the grain is soft, and the straw retains a great proportion of its natural juices, consequently requires a long time in the field, before either the grain is hardened, or the straw sufficiently dry. When put into the stack sooner it is apt to heat, and much loss is frequently sustained. It is a custom with many farmers to have an opening in the middle of their barley stacks from top to bottom. This opening is generally made by placing a large bundle of

straw in the centre of the stack when the building commences, and, in proportion as it rises, the straw is drawn upwards, leaving a hollow behind; which, if one or two openings are also left in the side of the stack near the bottom, insures so complete a circulation of air, as not only to prevent heating, but to preserve the grain from becoming musty.

On Oats.

OF this grain the varieties are more numerous than of any other of the culmiferous tribe. These varieties consist of what is called the common oat; the Angus oat, which we consider as an improved variety of the other; the Poland oat; the Friesland oat; the red oat; the dun oat; the Tartar or Siberian oat; and the potatoe oat. The Poland and potatoe varieties are best adapted to rich soils; the red oat, for late climates; and the other varieties, for the generality of soils of which the British isles are composed. The Tartar or Siberian kind, though very hardy and prolific, is much out of use, being of a coarse substance, and unproductive of meal. The dun oat has never been much cultivated; and the use of

Poland's and Friesland's is now much circumscribed since potatoe oats were introduced, the latter being considered, by the most discerning agriculturists, as of superior value, in every respect, where the soil is rich and properly cultivated.

Preparation — Oats are chiefly sown after grass; sometimes upon land not rich enough for wheat that had been previously summer-fallowed, or had carried turnips; often after barley, and rarely after wheat, unless cross-cropping, from particular circumstances, becomes a necessary evil. One ploughing is generally given to the grass-lands, usually in the month of January, so that the benefit of frost may be gained, and the land sufficiently mellowed for receiving the harrow. In some cases a spring furrow is given when oats succeed wheat or barley, especially when grass-seeds are to accompany the crop. The best oats, both in quantity and quality, are always those which succeed grass; indeed, no kind of grain seems better qualified by nature for foraging upon grass land than oats; as a full crop is usually obtained in the first instance, and the land left in good order for succeeding ones.

Quantity of Seed.—From twelve to eighteen pecks of seed is generally allowed to the Scotch acre of ground, according to the richness of soil, and the variety that is cultivated. Here it may be remarked, that land sown with potatoe oats requires much less seed, in point of measure, than when any of the other sorts are used; because potatoe oats both tiller well, much better than Poland ones, and have not an awn or tail like the ordinary varieties. On that account, a measure contains many more seeds of them than of any other kind. If land is equally well cultivated, we have little doubt but that the like quantity of seed, as given when barley is cultivated, may be safely trusted to when potatoe oats are to be raised.

Harvesting.—Oats are a hardy grain, and rarely get much damage when under the harvest process, except from high winds, or from shedding, when opened out after being thoroughly wetted. The early varieties are much more liable to these losses than the late ones, because the grain parts more easily from the straw; an evil to which the best of grain is at all times subject. Early oats, however, may be cut a little quick,

which, to a certain extent, lessens the danger to which they are exposed from high winds; and, if the sheaves be made small, the danger from shedding after rains is considerably lessened, because they are thus sooner ready for the stack. Under every management, however, a greater quantity of early oats will be lost during the harvest process than of late ones; because the latter adhere more firmly to the straw, and consequently do not drop out so easily as the former.

Produce.—Oats are generally supposed to be more productive in Scotland than in England; and the quality of the produce is also, in like manner, supposed to be considerably superior. Were it necessary to assign reasons for the difference, the following might be mentioned:—

1. In Scotland, this grain gets an equal share of good soil with others; whereas in England, the worst or inferior soils are usually allotted for the growth of oats, the best being reserved for wheat and barley.
2. The climate of Scotland may be considered as more favourable to oats than that of England, being of a moister nature, and rarely so warm, consequently better calculated to bring the grain to perfection. When a dry summer

occurs in Scotland, it rarely happens that oats yield well, either in the barn or the mill, being of a smaller size, thicker in the husk, and with a longer awn or tail than they usually are in moist seasons. Though we do not urge these reasons as sure and certain ones why the produce, as to quantity and quality, is different in the two countries, yet we are much inclined to think that, to one or other of them, or to them both conjoined, the difference may be fairly ascribed.

BEFORE we finish this part of the subject, it may be necessary to urge a few words more in favour of the potatoe oat, one of the most valuable varieties cultivated at this time in the island. The origin of this variety cannot be easily traced; but it was pretty generally introduced over all Scotland in 1801 and 1802, and is now the oat most generally cultivated upon all soils of decent quality, or in good condition. It is not a favourite with some people upon shallow soils, as it yields less fodder than other varieties; but upon all deep or tender loams, especially such as have been taken up from grass, no kind of oat will make such an abundant return to the farmer, whether the number of bolls per acre,

or the quantity of meal produced from these bolls, be considered. Perhaps this variety has, in some respects, degenerated already, owing to the farina of other oats having communicated with it; but this remark was more applicable when potatoe oats were first introduced, and sown in small quantities in the same field with other varieties, than at this time when whole fields are occupied with them. Still it is allowed, that degeneracy has taken place to a certain extent; but it is presumed that the consequences might be removed with ease, were first principles returned to. To make a selection of the strongest ears, which carry the purest grain, is not a difficult business; and were this selection attended to by half a dozen farmers in a district, it is obvious, that the breed, or variety, might be preserved pure and uncontaminated. If slovenly farmers were not provided with good seed, it would then be their own fault, since, if they would not take the trouble to select and breed for their own use, they might always be provided by those who were either better qualified for making the selection, or were more attentive to the interests of agriculture.

On Rye.

RYE was much more extensively cultivated in Britain in ancient than in moderate times, being then a general article of bread-corn, though now only partially used in certain districts for that purpose, or in the distillation of spirits. Perhaps to change of taste, or want of consumpt, may be attributed the great decrease of this grain; for, upon sandy soils, none are more productive, nor will any pay the farmer better, for the expence of cultivation, than this unfashionable grain.

RYE ought never to be sown upon wet soils, nor even upon sandy soils where the subsoil is of a retentive nature. Upon downs, links, and all soft lands, which have received manure, this grain thrives in perfection, and, if once covered in, will stand a drought afterwards that would consume any of the culmiferous tribe. The several processes may be regarded as nearly the same with those recommended for wheat, with the single exception of pickling, which rye does

not require. Rye may be sown either in winter or spring, though the winter-seeded fields are generally bulkiest and most productive. It may succeed either summer-fallow, clover, or turnips; even after oats, good crops have been raised, and where such crops are raised, the land will always be found in good condition.

SECT. III.

On the Cultivation of Leguminous Crops.

THOUGH culmiferous crops have, in all ages, been regarded as most profitable for the husbandman, there is no doubt, that rural management is most suitably exercised, when due attention is paid to the preparative crops, or those which are naturally calculated to enrich or fertilize the soil, and to furnish an increased stock of manure for supporting and invigorating its powers, after having carried culmiferous crops. These preparative or enriching crops are usually called

leguminous ones; and here we shall rank under that head, 1. Beans; 2. Pease; 3. Tares; 4. Potatoes; 5. Turnips; 6. Ruta Baga; 7. Cabbages; 8. Carrots. Clover and rye-grass might, with propriety, have also been included; but these we shall reserve as subjects for the next Chapter.

On Beans.

BEANS are a grain long known in Britain; but it is only of late years that they were extensively cultivated upon general soils, being formerly considered as adapted only to rich and moist clays. At that time, they were all sown according to the broad-cast system; in which way, instead of benefiting the ground, they were often of incalculable detriment. Weeds got away at the outset, and, in dry seasons, often ruined the crop; whilst, in every season, the grass or perennial weeds, which happened to be in the ground, increased in strength and in quantity, the openness of the bean crop at bottom allowing them to thrive without interruption.

THE drilling of beans with a small mixture of pease is now become a general practice, in every well cultivated district, more particularly in those where soil and climate permit the practice to be successfully executed. In this way, not only heavy crops are raised, but, what is of great importance, the ground is kept constantly in good order, provided suitable attention is bestowed upon the cleaning process. This is generally carried on by horse-hoeing the crop at different times, so long as the hoe can be used without doing damage; and in this way, an able auxiliary is brought forward to the assistance of summer fallow, whereby less stress need be laid upon that radical process than otherwise would be indispensably necessary.

THE different branches of bean culture may be divided into,—preparation, mode of sowing, quantity of seed required, hoeing process, harvest management, and produce. These particulars shall be briefly illustrated.

Preparation.—Beans naturally succeed a culmiferous crop; and we believe it is not of much importance which of the varieties are fol-

lowed, providing the ground is in decent order, and not worn out by the previous crop. The furrow ought to be given early in winter, and as deep as possible, that the earth may be sufficiently loosened, and room afforded for the roots of the plant to search for the requisite nourishment. This first furrow is usually given across the field, which is the best method when only one spring furrow is intended; but as it is now ascertained that two spring furrows are highly advantageous, perhaps the one in winter ought to be given in length, which lays the ground in a better situation for resisting the rains, and renders it sooner dry in spring, than can be the case when ploughed across. On the supposition, that three furrows are to be given, one in winter, and two in spring, the following is the most eligible preparation.

THE land being ploughed in length, as early in winter as is practicable, and the *gaw* and head-land furrows sufficiently digged out, take the second furrow across the first as soon as the ground is dry enough in spring to undergo the operation; water-furrow it immediately, and dig again the *gaw* and head-land furrows, otherwise

the benefit of the second furrow may be lost. This being done, leave the field for some days, till it is sufficiently dry, when a cast of the harrows becomes necessary, so that the surface may be levelled. Then enter with the ploughs, and form the drills, which are generally made up with an interval of 27 inches. In the hollow of this interval, deposit the seed by a drill-barrow, and reverse or slit out the drills to cover the seed, which finishes the process for the time. In ten or twelve days afterwards, according to the state of the weather, cross-harrow the drills, thereby levelling the field for the hoeing process. Water-furrow the whole in a neat manner, and spade and shovel the *garw* and head-land furrows, which concludes the whole process.

This is the most approved way of drilling beans, though, in some seasons, upon wet soils, such a method cannot be practised. The next best mode is therefore to give only one spring furrow, and to run the drill-barrow after every third plough, in which way, the intervals are nearly of the same extent as already mentioned. Harrowing is afterwards required, before the young plants reach the surface, and water-fur-

rowing, &c. as formerly described. In this manner, heavy crops have been raised, though not with such exactness as is practicable in the other. The ground is also left in a worse condition, consequently the hoeing process is performed with greater difficulty, and rarely executed in a perfect manner. These inconveniences, however, must be submitted to in adverse seasons; indeed, they often cannot be avoided by the most dexterous husbandman, unless seed-time is put so far back as to render the after-crop an unproductive one.

DUNG is often given to beans, especially when they succeed wheat, which had not received manure. The best way is to apply the dung on the stubble before the winter furrow is given, which greatly facilitates the after process. Used in this way, a fore stock must be in hand; but where the farmer is not so well provided, spring dunging becomes necessary, though evidently of less advantage. At that season, it may either be put into the drills before the seed is sown, or spread upon the surface and ploughed down, according to the nature of the drilling process, which is meant to be adopted. Land dunged to

beans, if duly hoed, is always in high order for carrying a crop of wheat in succession. Perhaps better wheat, both in respect of quantity and quality, may be cultivated in this way, than in any other mode of sowing. Different machines have been invented for drilling beans; but the most common and handy implement is one of the barrow form. This hand drill is pushed forward by a man or woman, and will, according as the brush or director is lowered or heightened, sow thicker or thinner, as may be expedient or necessary. Another machine, drawn by a horse, and sowing three drills at a time, has been constructed, and, upon flat lands will certainly distribute the seed with the most minute exactness. Upon unequal fields, and even on those laid out in high ridges, the use of this machine is attended with a degree of inconvenience sufficient to balance its advantages. The hand-drill therefore, in all probability, will be retained for general use, though the other is capable of performing the work with minuter regularity.

Quantity of Seed.—In England, beans are usually sown much thinner than repeated trials, which have been made, will authorise in Scot-

land. The English writers speak of two or three bushels as a sufficient quantity to seed an acre ; whereas less than five cannot be used in Scotland, without producing a small crop, and a foul field. As the English acre is one-fifth less than the Scottish, it would appear, that less than four bushels ought not to be hazarded, if a full crop is expected. We seldom have seen thin beans turn out well, unless the soil is particularly rich ; nay, unless the rows close, weeds will get away after the cleaning process is finished, thereby disappointing the object of drilling, and rendering the system of little avail towards keeping the ground in good condition.

Hoeing process.—Beans are cleaned in various ways ; 1. By the hand-hoe ; 2. By the scraper or Dutch-hoe ; 3. By a plough of small dimensions, but constructed upon the principles of the approved sowing plough. Ploughs with double mould-boards are likewise used to earth them up ; and, with all good managers, the weeds in the drills, which cannot be touched by the hoe, are pulled out by the hand, otherwise no field can be considered as duly cleaned.

IN treating of the cleaning process, without noticing farther the various ways in which it is executed, we shall confine ourselves to the one which we have found most suited to the generality of bean soils. About ten or twelve days after the young plants have appeared above the surface, enter with the scraper, and loosen any weeds that may have vegetated. At this time, the wings or cutters of the implement ought to be particularly sharp, so that the scraper may not run too deep, and throw the earth upon the plants. In about ten days after the ground is scraped, according to the state of the weather, and other circumstances, use the small swing plough to lay the earth away from the sides of the rows ; and, in doing so, go as near to the plants as possible, taking care, at the same time, not to loosen their roots. If any weeds stand in the rows, pull them out with the hand ; afterwards earth-up the plants with the small swing plough, or run the scraper in the intervals, as may seem expedient. Both ways are eligible ; but, when properly earthed up, some people are of opinion that the plants are nourished by the operation ; while others think that the benefit gained in that way is counterbalanced by the ex-

tra trouble attendant upon cutting the crop, the bottom being necessarily more unequal than when the scraper is employed to conclude the cleaning process.

Harvest Management.—Before beans are cut, the grain ought to be tolerably well ripened, otherwise the quality is impaired, whilst a long time is required to put the straw in such a condition as to be preserved in the stack. In an early harvest, or where the crop is not weighty, it is an easy matter to get beans sufficiently ripened; but, in a late harvest, and in every one where the crop takes on a second growth, it is scarcely practicable to get them thoroughly ripened for the sickle. Under these circumstances, it is unnecessary to let beans stand uncut after the end of September or the first of October; because any benefit that can be gained afterwards is not to be compared with the disadvantages that accompany late wheat seed-time. Beans are usually cut with the sickle, and tied in sheaves, either with straw ropes, or with ropes made from peas sown along with them. It is proper to let the sheaves lie untied several days, so that the winning process may be hastened, and, when tied, to set them up

on end, in order that full benefit from the air may be obtained, and the grain kept off the ground. In building bean stacks, it is an useful measure, for preserving both grain and straw from injury, to keep an opening in the centre, and to convey air from the extremity by a *bale* or funnel. Beans, on the whole, are a troublesome crop to the farmer, though of great utility in other respects. Without them heavy soils can scarcely be managed with advantage, unless summer fallow is resorted to once in four years ; but, by the aid derived from drilled beans, summer fallow may be avoided for eight years, whilst the ground, at that period, will be found in equal if not superior condition.

Produce.—Beans, where proper management is exercised, and natural diseases avoided, are generally a crop of considerable value, yielding from 32 to 40 bushels per Scottish acre. The straw, especially when mixed with peas, is also of great advantage to the working stock, affording almost as much nourishment, when properly harvested, as is gained from hay of ordinary quality. The broad-cast crops are sometimes of equal value with those that are drilled ; but the true object of

beans being to prepare the ground for the admission of another crop of much greater value, it follows, of course, that every mode of cultivating them, which precludes the ground from being suitably cleaned, ought to be reprobated and condemned by the practical agriculturist, who wishes to keep his land constantly in good order; and under a rotation of crops capable of yielding the largest return at the least possible expence.

IT has been disputed whether broad or narrow intervals are most advantageous, and the latter mode has been chiefly adopted in the English bean districts, though evidently hostile to perfect culture. Hand-hoeing is therefore generally resorted to; though that operation, at the best, is of small avail on clay soils. Whether by the use of narrow or broad intervals, the weightiest crop can be raised, seems, at first sight, problematical; doubts on this point occasioned us, many years ago, to make trials to ascertain the most proper distance, and the result of these trials shall now be detailed.

WE marked off an acre of ground, the soil a light free loam, which had carried a crop of oats the preceding year. It was deep ploughed in winter, and received dung previous to the seed-furrow, which was given as shallow as possible, in order that the plants might have sufficient soil to strike down their roots. It was divided into three parts. Part No. 1. was drilled with intervals of 27 inches, or, in other words, the barrow followed every third plough. No. 2. was drilled after the second plough, which reduced the intervals to 20 inches, or thereby. No. 3. had intervals of the same breadth as No. 1. ; but two rows stood together, or in each furrow, which gave about the same number of drills as stood on part No. 2. and about one-third more than part No. 1. They were sufficiently harrowed immediately before brairding, carefully hand-hoed afterwards, and finally bulked up with a neat double-moulded board plough, which performed the work in a very perfect manner. The crop at harvest was good ; but, when cut, the stalk was smaller, and the pods not so well filled upon those which occupied No. 2, as upon the other two divisions, where the intervals were wider, and consequently a freer admission given to the air,

which we have since found to be necessary in the culture of every article of the leguminous kind. When the crop was thrashed, it was found that one firlot more beans were upon No. 1. than upon No. 2.; and No. 2. only returned the same produce as No. 1. though it contained several more drills; besides, owing to the double rows, it was nothing like so well cleaned. The inferences drawn at the time, and which have since guided our conduct in this branch of husbandry, were, 1st, That a certain portion of air was required to bring beans to perfection; and that the quantity to be procured, when the intervals were only 18 or 20 inches, was not sufficient for that purpose. 2d, That intervals less than 27 inches would not admit the full benefit of ploughing, which is a chief object in the drill husbandry. And, lastly, that double rows, with wide intervals, were not advantageous, as they neither returned a greater produce, nor allowed the ground to be so well cleaned as single rows.

SINCE the above trial, we have uniformly drilled beans upon a great scale, according to the first mentioned method, with this single alteration, that the hand-hoe is laid aside, and the

whole operation performed by horse labour. The different ploughings are given with one horse, and repeated according to the nature of the soil, and the dryness of the weather. This is the cheapest and most effectual way of cultivating beans; and indeed it is in this way that beans are now generally cultivated.

IMPRESSED with a sense of the advantages resulting from bean husbandry, when the land is properly drilled and cleaned, and considering it as equally beneficial upon loams and clays with the husbandry of turnips upon soft, dry, or kindly soils, we have persevered for many years in making beans a regular article in our rotation of husbandry. In the course of our practice, we have found them an excellent assistant to fallow, and their culture a good preparation for wheat. Several years ago, when that useful institution, the Society of Arts in London, offered a premium for the culture of beans, to be succeeded by wheat sown in the same season, an essay on that subject was delivered to the Secretary of the Society, which in substance was as follows.

I TAKE the liberty of transmitting to you an account of eighty-eight and a half acres of land drilled with beans in the months of February and March 1798, among which a few pease were mixed, in order to improve the straw as fodder for horses, and for making ropes to tie the crop. The whole of the said lands was sown with wheat in the month of October the same year. I shall shortly state the mode of managing the beans, being ready to give any further information that may be required.

THE land was first cross-ploughed during the preceding winter, and about twenty acres were dunged previous to this furrowing being given, and ten acres more in the spring, when the beans were drilled. The quantity of dung applied to the acre was about twelve cart-loads, each drawn by two horses, the weight of which might be about a ton. The land at seed time was clean ploughed over, and the drill-barrow followed every third plough, which gave an interval between the rows of twenty-six or twenty-seven inches. The quantity of seed sown was from seventeen to nineteen pecks per acre, as those who managed the drill sometimes from inatten-

tion allowed it to sow a degree thicker at one time than another. The kind of beans sown was the common horse bean, mixed, as I have already said, with a trifling quantity of pease; and the average produce per acre of the whole fields sown was nearly thirty-six bushels per acre, the produce being altogether 3258 bushels, Winchester measure. They were reaped from the first to the middle of September, and the straw was used for supporting the working-horses during the winter months.

It is now proper I should explain my method of cleaning or ploughing the land, when the crop was on the ground, which was effected by a one-horse plough, without any hand-hoe being used. I first harrowed it completely before the beans appeared above ground, and water-furrowed and griped it. As soon as the beans would stand the plough, a gentle furrow was given, and women were employed to turn any of the earth from the plants which might have been thrown upon them. Every succeeding furrow was taken deeper, and the last was used for laying the earth up close to the plants, which I consider as of great importance. They were ploughed four times: and I estimat-

ed the whole expence of cleaning them at four shillings per acre, and that of drilling and harrowing at one shilling and fourpence. In no other way can the ground be cleaned at a less expence.

THE soil upon which they were sown was a loam of different varieties. I have for many years practised this mode of husbandry for raising beans, which have uniformly been succeeded by wheat, and shall be happy to give you any information in my power respecting the culture of them. This year I have 110 acres, all managed in the way described. I inclose two certificates, one of the measurement, and the other from two farmers of character, that I had such fields in beans and wheat.

It need only be added, that since this communication was made to the Society of Arts, various improvements have been introduced into this important branch of husbandry, particularly in the culture given to the land before receiving the seed, as described in the account already given. Indeed, the bean system has now arrived at a considerable degree of perfection; though

system is of little importance, unless the processes which belong to it are attentively executed.

Of Pease.

THE culture of pease is now much out of use in various parts of Britain, being found unprofitable, and tending greatly to injure the ground by the quantity of annual and perennial weeds which accompanied the crop, or, more strictly speaking, which were allowed to grow and come to perfection, from the nature of the culture usually given to pease. Drilling has been resorted to for the purpose of removing that defect, but seldom with much advantage, as the plant drops early down, and thus prevents the necessary hoeing. Pease, however, are partially sown with beans to great advantage; and, when cultivated in this way the same system of preparation, &c. described under the head of beans, is to be adopted. Indeed, upon many soils too deep enough for beans, a mixture of pease to the extent of one-third of the seed sown, proves highly advantageous. The beans serve as stabs or props to the pease, and the latter being thus kept off the ground, and furnished with air, and other atmospherical nu-

triment, blossom and pod with much greater effect than when sown according to the broadcast system.

PEASE agree well with lime and other calcareous stimulants, and can hardly be reaped in perfection where these are wanting. The varieties cultivated are numerous; but those adapted to field culture may be divided into two kinds, namely, early and late; though these branch out again into several varieties. We have white pease, both early and late, and likewise gray pease, possessed of similar proprieties. The nomenclature is entirely arbitrary, and therefore not to be illustrated. As a general rule, the best seed-time for late pease, is either in February or March, though early ones, such as the Hasting or Magbiehill pea, may be sown successfully after the first of May. Pease ought to be sown tolerably thick, so that the ground may be covered as early as possible. Perhaps less than five bushels or firlots ought not to be sown upon a Scotch acre, because the plants never do much good till they begin to lock or twist together. Broadcast pease, however, are now rarely seen, except in upland districts, where soil and climate render beans unfit to be cultivated. One furrow is ge-

nerally bestowed upon the crop; and the seed sown is, for the most part, one or other of the early varieties. White, or boiling pease, are sown in several of the English counties; but as they do not come regularly under the husbandman's notice, it is unnecessary to treat of them in this place.

BOTH pease and beans are taken in England after grass; but this system we must condemn as a departure from the principle, which considers the alternate mode of cropping as most wise and beneficial. Perhaps we have too few of the leguminous articles; none of them, therefore, should be taken in succession. If grass is broke up with oats, then pease and beans follow with propriety; but to take the latter, in the first place, is setting system at defiance, and introducing confusion into the after rotation.

Of Tares.

TARES, vetches, and Scotch grey pease appear to be members of the same family. Possessing similar properties, and yielding similar nourish-

ment, they are capable of being used for the same purposes at different seasons. Taking tares to be the father of the family, and estimating it of vast advantage when used as an article of green food, we shall restrict our observations to this plant; though each of them is equally applicable to vetches, and those sorts of grey pease cultivated in many districts for the use of the working stock, particularly at that critical period, which ensues betwixt the two crops of grass, when, if drought sets in, green food cannot otherwise be procured.

THE tare is a plant of a hardy growth, and, when sown upon rich land, will return a large supply of green fodder, for the consumption of horses, or for fattening cattle. When intended for this purpose, the seed ought to be sown tolerably thick, perhaps to the extent of four bushels per Scots acre, though, when intended to stand for seed, a less quantity is required; because otherwise, the thickness of the crop will prevent the plants from blossoming and podding in a sufficient way. When meant for seed, early sowing ought to be studied, otherwise the return will be imperfect; but when for green food, any time

betwixt the first of April and the latter end of May will answer well, provided crops in succession from the first to the last mentioned period be regularly cultivated. Instances are not wanting of a full crop being obtained even when the seed was sown so late as the middle of June, though sowing so late is a practice not to be recommended. After the seed is sown, and the land carefully harrowed, a light roller ought to be drawn across, so that the surface may be smoothed, and the scythe permitted to work without interruption. It is proper also to guard the field for several days against the depredation of pigeons, who are remarkably fond of tares, and will pick up a great part of the seed, unless constantly watched.

HORSES thrive very well upon tares, even better than they do upon clover and rye-grass; and the same remark is applicable to fattening cattle, who feed faster upon this article of green fodder than upon any kind of grass, or esculent, with which we are acquainted. Danger often arises from their eating too many, especially when podded; as cholics, and other stomach disorders, are apt to be produced by the excessive loads

which they devour. Perhaps a great quantity of fixed air is contained in this vegetable; and as heavy crops are rarely dry at the root when cut, it is not to be wondered that accidents often happen when the animal is indulged with the unrestrained consumption of them. Were oat straw mixed with the tares in the racks or stalls in which they are deposited, it is probable that fewer accidents would follow, though this assistant is only required when the tares are wet, foul, and over succulent. Be this as it may, the utility of tares is abundantly evident; because they are furnished at a time when often no other green food can be obtained. It is only by using a large quantity of green food, that a sufficient stock of dung can be gathered, for carrying forward a profitable system of management upon arable land. With clover and rye-grass, tares, turnips, and ruta бага, it is perfectly practicable to feed through the whole season; thereby causing an arable farm to feed a great number of cattle, whilst the corn land is supported and enriched by the offal or dung produced by these cattle. This is a subject, however, which falls more particularly to be treated of in the succeeding Chapter; we shall therefore reserve what we

mean to say upon it, till the Grass Husbandry comes under consideration.

Of Potatoes.

POTATOES, as an article of human food, are, next to wheat, of the greatest importance in the eye of a political economist. From no other crop that can be cultivated will the public derive so much food as from this valuable esculent; and it admits of demonstration, that an acre of potatoes will feed double the number of people that can be fed from an acre of wheat. Potatoes are also a nourishing and healthy food, relished almost by every palate; and without them, it is believed, there is hardly a dinner served up, for six months of the year, in any part of the kingdom. Notwithstanding all these things, and they are of great importance in one point of view, we are doubtful whether potatoes can be placed so high in the scale as several other articles of produce, when the profit and loss account of the agriculturist is to be ascertained. They require a great deal of manure from the farmer, while, generally speaking, little is returned by them; they are a bulky

unhandy article, troublesome in the lifting and carrying processes, and interfering with the seed season of wheat, the most important one to the farmer. After all, from particular circumstances, they cannot be vended unless when raised in the vicinity of large towns; hence they are, in every respect, an unprofitable article to the agriculturist. To him the real criterion is the profit which potatoes will return in feeding beasts; and here, we apprehend, the result will altogether be in favour of turnips, and ruta baga, as the most profitable articles for that purpose.

BUT, laying that criterion aside, and considering potatoes as an article useful to mankind, and consequently beneficial in a public point of view, it is proper to illustrate the culture of this esculent in the various stages, from preparing the ground, till the crop is dugged up and ready for market. The subject has been so amply discussed in many recent publications, that it is unnecessary, in this place, to enlarge upon the several processes.

Preparation of the Ground.—To work the ground till it is completely reduced and free from

root-weeds, may be considered as a desideratum in potatoe husbandry; though, in many seasons, these operations cannot be perfectly executed, without losing the proper time for planting, which never ought to be beyond the first of May, if circumstances do not absolutely interdict it. Three ploughings, with frequent harrowings and rollings, are necessary in most cases, before the land is in a suitable condition. When this is accomplished, form the drills as if they were for turnips; cart out the manure, which ought not to be sparingly applied, plant the seed above the manure, reverse the drills for covering it and the seed, then harrow the drills in length, which completes the preparation and seed process.

Quantity of Seed.—It is not advantageous to cut the seed into small slips; for the strength of the stem at the outset depends in direct proportion upon the vigour and power of the seed-plant. The seed-plant, therefore, ought to be large, rarely smaller than the fourth part of the potatoe; and, if the seed is of small size, one-half of the potatoe may be profitably used. At all events, rather err in giving over large seed than in making it too small; because, by the first error, no

great loss can ever be sustained ; whereas, by the other, a feeble and late crop may be the consequence. When the seed is properly cut, it requires from ten to twelve hundred weight of potatoes to plant a Scottish acre of ground, where the rows are at 27 inches distance ; but this quantity depends greatly upon the size of the potatoes used. If they are large, a greater weight may be required ; but the extra quantity will be abundantly repaid by the superiority of crop which large seed usually produces.

Of the kind of Potatoes which can be most profitably cultivated —The varieties of this excellent root cultivated in Britain are become so numerous, that it is impossible to treat of each, or even to give a list of their names or particular properties. It is almost certain that a new variety may be propagated at any time, by mixing contrary sorts in the same drill ; and, if these are allowed to come to maturity, a kind of connection takes place betwixt the blossoms of each, which produces a new race or variety. In this way, the numerous varieties of the potatoe root now prevailing in Britain have been procreated and introduced. The leading and prevailing variety of

field potatoes is the yellow kidney, which, though not the most prolific, is the most generally relished potatoe that is cultivated. The black potatoe is the next favourite ; though it deserves to be remarked, that this kind, being rarely taken up in a ripe state, is not fit for use till the spring months, when it gets a closeness of texture and mellowness, which it does not possess at an earlier period. These two varieties, therefore, serve every useful purpose ; the yellow kidney for winter use, and the black afterwards. It is unnecessary, in a work of this kind, to enter upon the early sorts of potatoes, because they are hardly known in common husbandry.

WHAT is called the *Yam*, or Surinam potatoe, is of more importance to the farmer ; because, with this variety, he has an excellent assistant to his turnip crop, or rather a succedaneum, which is of material benefit when turnips are consumed. Perhaps this root may be cultivated with greater advantage than ruta бага upon many soils, as the precariousness of ruta бага has been acknowledged by almost every one who has treated upon the subject. It requires soil of the best quality, and a large dose of rich dung, to insure even a

middling crop, therefore can never be generally nor profitably cultivated upon inferior soils. We are well aware, that a root is nearly of one third more weight than one of turnips of the same size, and that, in point of nourishment, there is also a very considerable difference. Still, after all, when we look abroad, and view the small crops that are commonly raised, and take into account the superior care bestowed upon this root, it must be acknowledged, that necessity, not profit, is the impelling cause of its culture.

ON the other hand, yams present every advantage which can be got from ruta бага, and are not so pettish in their growth. Their culture is a matter of far less difficulty, as they will grow upon soils where ruta бага would starve. They require less manure, and may be planted as late in the season as the other, thereby enabling the farmer to bestow the like previous preparation upon the ground, the want of which is a general argument against ordinary potatoe husbandry. By taking them up in October or November, they may be safely housed, and the ground directly ridged up and sown with wheat. No doubt, ruta бага may be removed at the same

period ; but it often happens that the root has not then reached maturity, its growth being rarely impeded till frost sets in.

IF potatoes are ever to be extensively introduced as an article of fallow crop, it must be with a view of occupying the place of ruta бага, or as the means of carrying on live stock, after turnips are consumed, till the grass season arrives. During the ordinary season of winter feeding, neither potatoes nor ruta бага can be furnished to stock on the same terms with turnips ; though, when turnips are gone, the next best resource must be sought after. This, in our opinion, can in many cases be gained with most facility by raising yams, which, as already said, are not so shy in growing, do not require so much manure, and thrive on soils where ruta бага would not yield a root much exceeding a common sized egg.

THOUGH yams are not to be ranked in value with turnips as an article of winter-feeding, it deserves attention that they may be successfully cultivated on soils physically unfit for the former root. In fact, the greatest crops of yams are procured from heavy lands ; the soft kindly soils,

generally considered most adapted to potatoe culture, being unfriendly to the growth, or rather to the productiveness of the variety which we are recommending.

Cleaning of potatoes.—After having detailed the method of cleaning beans so circumstantially, it appears unnecessary to enter at much length upon what is required for potatoes, because one and all of the green crops require somewhat similar management when cultivated according to the drill system.—The only difference is, that hand-hoeing is necessary betwixt the plants ; but, in other respects, every part of the cleaning process may be most successfully executed by the horse-hoe. Once for all, it may be remarked, that green crops of every kind are greatly benefited by frequent hoeings, and that their growth, in some measure, is regulated by the extent of labour bestowed on them. When treated in a slovenly manner, or left to fight with weeds, or even to encounter a firm soil, the plants are deprived of nourishment, and unable to procreate their kind in due abundance ; on the contrary, when the soil is sufficiently stirred up, and kept free of weeds, nature will return a crop in direct

proportion to the quality of the soil, and the quantity of manure bestowed upon it by the cultivator. Nature may be improved by art ; but, when her bounties are neglected, and not improved, she generally turns aside, and repays the contempt with interest.

Disease which affects potatoes.—The disease which peculiarly affects potatoes is called the *curl*, the real cause of which has not yet been, and probably never will be ascertained. It seems to be one of these secrets of nature kept from the knowledge of man ; and, though many plausible and ingenious theories have been offered to the public concerning it, we are just as much in the dark with respect to this abstruse subject as when the evil was first discovered.

LANCASHIRE was the first district of the kingdom in which potatoes were extensively cultivated ; and it was there that the curl first made its appearance in 1778 ; before which period it was altogether unknown. The disease, however, rapidly spread over all the low country, or earliest districts, and threatened to put an end to the culture of a root confessedly of manifest utility

in supporting the inhabitants. Roused by such an evil, several societies offered premiums for discovering the most proper means of averting the threatened danger ; and the pens of hundreds of agricultural theorists were put in requisition, to ascertain the nature of the disease, and the most efficient and salutary remedies for removing it. The nature or cause of the disease, as already said, remains unknown ; though it is sufficiently ascertained that, by procuring seed-roots from the upland districts, the disorder may be averted for one season at least. The theory which would seem to follow from this result of practice is, that the curl is occasioned by an over-ripeness of the plant, whereby its strength, or procreative power, is so much debilitated as to render it unable to bring forward a healthy plant afterwards. We by no means consider this theory as incontrovertible, though undoubtedly it rests upon as strong a basis as many others that have been offered. The fact is, as we have stated, that seed from upland districts will not curl in the first year, when planted in the low districts, though the lowland seed, carried to the first-mentioned districts, are affected as speedily with the disorder as if they had been planted at home.

When this baneful disease can be so easily prevented, it is very foolish to risk suspected seed ; and the increased expence of purchasing from the late districts is of small consequence, when compared with the danger encountered by the use of old seed. The benefit of such a change is, however, so generally understood, that it is unnecessary to insist farther upon it.

Method of taking up the crop, and storing it for consumption.—Potatoes are generally digged up with a three-pronged grape or fork ; but at other times, when the weather is dry, the plough is used, which is the most expeditious implement. After gathering the interval, the furrow taken by the plough is broken and separated ; in which way the crop may be more completely gathered than when taken up by the grape. The potatoes are then stored up for winter and spring use ; and as it is of importance to keep them as long through summer as possible, every endeavour ought to be made to preserve them from frost, and from sprouting in the spring months. The former is accomplished by covering them well with straw when lodged in a house, and by a thick coat of earth when deposited in a pit ; and

the latter, by picking them carefully at different times when they begin to sprout, drying them sufficiently by exposure to the sun, or by a gentle toast on a kiln. Careful people often preserve potatoes in perfection till the succeeding crop is fit for use ; though it rarely happens that they possess their original qualities after summer commences.

Mode of using potatoes for horse-food.—Potatoes are used in several districts for feeding horses after being partially boiled or steamed ; which preparatory process makes the animals consume them with more avidity. A working horse eats about 42 lb. averdupois per day, with three-fourths of a stone of hay, or thereabouts ; and with this allowance is capable of working vigorously in the field, and, at the same time, to continue in good health and condition. The best plan of preparing the potatoes is to provide a large boiler of cast metal, with lead pipes to conduct the steam, the stop-cocks of which are of brass. These last open into oak tubs filled with potatoes, the aperture that admits the cock being near the bottom of the tub. The steam ascends through the potatoes and boils them, the

skins cracking as if the roots had been boiled in water. A handful of chaff thrown over the top assists in confining the steam. In inland districts, where the demand for potatoes is of a limited nature, this mode of consumption seems advisable, especially as it tends to lessen the consumption of oats, and to increase the quantity of green crops; circumstances which promise important advantages to the husbandry and population of the island.

Of Turnips.

THE introduction of turnips into the husbandry of Britain occasioned one of those revolutions in rural art which are constantly occurring among husbandmen; and, though the revolution came on with slow and gradual steps, yet it may now be viewed as completely and thoroughly established. Before the introduction of turnips, it was impossible to cultivate light soils successfully, or to devise suitable rotations for cropping them with advantage. It was likewise a difficult task to support live stock through the winter and spring months; and, as for feeding and prepar-

ing cattle and sheep for market during these inclement seasons, the practice was hardly thought of, and still more rarely attempted, unless where a full stock of hay was provided, which only happened in a very few instances. The benefits derived from turnip husbandry are therefore of great magnitude. Light soils are now cultivated with profit and facility; abundance of food is provided for man and beast; the earth is turned to the uses for which it is physically calculated; and, by being suitably cleaned with this preparatory crop, a bed is provided for grass seeds, wherein they flourish and prosper with greater vigour than after any other preparation.

TURNIPS are cultivated in two ways, viz. in the broad-cast and drilled method. In the first way, we view the benefit of this root as but partially and incompletely gained; for, though a full crop may be obtained, the ground cannot be cleaned sufficiently as when the drill system is adopted. The great body of cultivators being of this opinion, it is unnecessary to discuss the merits of the two systems; therefore we shall proceed to detail the various processes which belong to the culture of this inestimable root, from the prepa-

ratory process till the period when the crop is to be used.

Preparation.—The first ploughing is given immediately after harvest, or as soon as the wheat-seed is finished, either in length or across the field, as circumstances may seem to require. In this state, the ground remains till the oat-seed is finished, when a second ploughing is given to it, usually in a contrary direction to the first. It is then repeatedly harrowed, often rolled between the harrowings, and every particle of root weeds carefully picked off with the hand; a third ploughing is then bestowed, and the other operations are repeated. In this stage, if the ground has not been very foul, the seed process generally commences; but often a fourth ploughing, sometimes a fifth, is necessary, before the ground is sufficiently cleaned. Less labour, however, is necessary now than in former times, when a more irregular mode of cropping was commonly followed.

Manuring.—Turnip land cannot be made too rich; for, in fact, the weight of the crop depends in a great measure upon its condition in this re-

spect. Manure is sometimes applied to the crop which immediately precedes the turnips; but, to answer well in this way, the land must naturally be of an excellent quality. In other cases, where the land is in good order, it is laid on the stubble previous to the first ploughing. But generally the dung is laid on immediately before the seed is sown; the ground is formed into drills or ridges, and the manure spread in the intervals between them; the drills are then split by the plough, the earth on each side covers the dung, forms a drill where the interval formerly was, and furnishes a bed for the seed. These operations are now so well understood, that it is unnecessary to describe them more particularly.

Sowing.—The next part of the process is the sowing of the seed. This, almost in every case since turnips were introduced into Scotland, has been performed by drilling machines, of different sizes and constructions, though all acting on the same principles. At this time, the fashionable machine is drawn by a horse in a pair of shafts, sows two drills at a time, and answers extremely well, where the ground is flat and the drills properly made up. The weight of the ma-

chine insures a regularity of sowing hardly to be gained by those of a different size and construction. From two to three pounds of seed are sown upon the acre, though the smallest of these quantities will give many more plants, in ordinary seasons, than are necessary ; but, as the seed is not an expensive article, the greater part of farmers incline to sow thick, which both provides against the danger of part of the seed perishing, and gives the young plants an advantage at the outset.

Time of Sowing.-- Turnips are sown from the beginning to the end of June ; but the second and third weeks of the month are, by judicious farmers, accounted the most proper time. Some people have sown as early as May, and with advantage ; but these early fields are apt to run to flower before winter, especially if the autumn be favourable to vegetation. As a general rule, it may be laid down, that the earliest sowing should be on the latest soils. Plants on such soils are often long before they make any great progress ; and, in the end, may be far behind those, in other situations, which were much later sown. The turnip plant, indeed, does not thrive

rapidly till its roots reach the dung ; and the previous nourishment afforded them is often so scanty, as to stunt them altogether before they get so far.

Cleaning Process.—The first thing to be done in this process is to run a horse-hoe, provincially called a scraper, along the intervals, keeping at such a distance from the young plants that they shall not be injured. This operation destroys all the annual weeds which have sprung up, and leaves the plants standing in regular stripes or rows. The hand-hoeing then commences, by which the turnips are all singled out, at a distance of from eight to twelve inches, and the redundant ones drawn into the spaces between the rows. The singling out of the young plants is an operation of great importance, for an error committed in this process can hardly be afterwards rectified. Boys and girls are always employed as hoers ; but a steady and a trusty manservant is usually set over them, to see that the work be properly executed.

IN eight or ten days, or such a length of time as circumstances may require, a horse-hoe

of a different construction from the scraper is used. This, in fact, is generally a small plough, of the same kind with that commonly wrought, but of smaller dimensions. By this implement, the earth is pared away from the sides of the drills, and a sort of new ridge formed in the middle of the former interval. The hand-hoers are again set to work, and every weed and superfluous turnip is cut up; afterwards the horse-hoc is employed to separate the earth, which it formerly threw into the furrows, and lay it back to the sides of the drills. On dry lands this is done by the scraper; but, where the least tendency to moisture prevails, the small plough is used, in order that the furrows may be perfectly cleaned out. This latter mode, indeed, is very generally practised.

Consumption.—A great part of turnips are consumed by sheep, because the feeding with these animals can be carried on upon a much larger scale, and at less expences than in most cases with cattle. It is customary, however, with many people, to consume their turnips both ways; they draw a certain number of drills, generally three or four in one place, and leave as many, or more, to be eaten with the sheep; by which me-

thod the whole ground is equally benefited by the urine and dung of the flock. Some farmers give their turnips to the wintering cattle, kept in the fold-yard upon straw, which causes them to feed very rapidly, when put to grass in the succeeding season; others give them to young stock, and probably with much advantage. Both these last plans are eminently beneficial to such farmers as are disabled, by local circumstances, from cultivating this root extensively.

WHAT is stated concerning turnips applies to the white or common kind; but there are other varieties of equal importance to the farmer, which ought not to be unnoticed. These are Yellow and Swedish turnips; articles of eminent benefit to feeders in the latter end of spring, when common turnips are useless.

Yellow Turnip.

THIS variety, as now cultivated in the field, is quite different from the yellow garden turnip, being larger in size, containing more juice or

nutritive substance, much easier cultivated, and preserving its powers till the middle of May, when the grass-season may be expected. Upon ordinary soils field yellow turnip is superior to ruta бага, because it will grow to a considerable weight, where the other would be stunted or starved; and it stands the frost equally well. No farmer who keeps stock to any extent should be without a few acres of this root. The mode of culture required is in every respect similar to what is stated concerning common turnips, with these exceptions, that earlier sowing is necessary, and that the plants need not be set out so wide, as they do not swell to such a large size.

Ruta Baga, or Swedish Turnip.

THIS is another article of great importance to the farmer, affording green food of the choicest quality, highly relished by every kind of stock, and of incomparable advantage in a late season, when either cattle or sheep are to be carried on for a market, or till a supply of grass can be procured. Indeed to procure such an article of green food, whereby stock could be supported between the

the turnip and grass seasons, was long a desideratum with the husbandman. This desirable object is completely gained by the introduction of yellow turnips and ruta бага, either of these roots being admirably calculated for filling up that blank in the year which farmers looked to with so much anxiety. The process of management is precisely the same as that of turnips, with this addition, that more dung is required, and that the seed ought to be sown three or four weeks earlier. Rich soil, however, is required for this article; for it will not grow to any size worth while on soils of middling quality, whatever quantity of dung may be applied.

RUTA бага is also of great advantage in the feeding of horses, either raw or boiled, or with broken corn. If a sufficient quantity were cultivated, a great deal of grain might be saved, while the health and condition of the working stock would be invigorated and augmented. An evening feed of this nutritious article would be of incalculable benefit; even the most of horses are fond of common turnip in a raw state; and it is a subject well worthy of every farmers attention;

whether it would not be for his interest to raise these esculents in such a quantity as to serve them during the long period when grass cannot be obtained. That the health of the animals would thereby be benefited is unquestionable; and perhaps the saving of grain would greatly exceed the trouble occasioned by furnishing a daily supply of these roots.

EVERY farmer, who wishes to have any of the varieties of turnip of a right kind, ought to save seed for himself. It is unnecessary to expect pure seed from the shops, unless an attention is bestowed in the rearing and winning processes, exceeding what is usually given by those concerned in these processes. Hence heavy losses are often sustained by cultivators who trust to these agents; and this has been the case particularly with ruta бага. A few years ago, this excellent root was nearly given up by many farmers, because a spurious seed was furnished by the shops. However, by the attention of some respectable agriculturists, seed of a better kind has again been obtained, which may restore the credit of this valuable root. This credit, however, is only to be preserved by a continuance of

the sedulity which caused its renovation; or, in other words, by keeping ruta бага at a distance from every other variety of the turnip and cabbage tribes, when forming its flowers, and procreating its successors.

WE now come to another branch of this subject, not of less importance in many districts than the raising of the crop; and that is the way of preserving turnips through the winter months, and having them at all times at hand, and in condition for feeding cattle and sheep even during the severest storms. With those who are acquainted with, or pay attention to the variable climate of Britain, this part of our subject will appear interesting, and of material consequence to the breeders and feeders of live-stock.

THOUGH turnips have been cultivated in this country to a considerable extent, for upwards of thirty years, yet storing is a practice of a much later origin, and still circumscribed within nar-

row bounds. From the first introduction of that vegetable, some intelligent farmers regularly carried off the crop, and laid up, under cover, a quantity of turnips sufficient for two or three weeks consumption. That practice, affording provision against the contingency of frost, has extended itself into every district where the turnip husbandry is properly understood. But the plan of raising and storing the whole crop, immediately after harvest, seems to have been adopted first in the Upper Ward of Clydesdale, and to have thence travelled slowly into the adjoining counties. Even in the place of its origin, this practice has met with opposition; and in no other has it yet gained a complete establishment.

THERE is considerable latitude in the season of storing. In wet and clay soils, to avoid the inconveniences of winter poaching, the ground must be cleared of the turnips immediately after harvesting the potatoes; but, in other soils, they may be allowed, with advantage, to remain on the ground some weeks later, as they continue to swell till overtaken by frost. The ordinary time is about the beginning of November. It is of considerable importance to raise them on a

dry day, that as little earth as possible may adhere to their roots, and to secure them in the store-heap as they are raised, as a slight degree of frost is then found to be highly injurious. As the month of November is proverbial for gloom and rain, it may sometimes, however, be necessary to raise them when the weather is wet, or when the ground is moist; and, in this case, the following practical hint may be of advantage. Grasp the turnips by the leaves, give them a smart turn about half round, and then pull them upright from the ground. During this operation, the bulbs revolve on the tap-root as on an axis; the rotatory motion breaks the lateral fibres, and rubs off the adhering earth. It is obvious that this method is much preferable to the common way of raising the turnip clumsily in each hand, and of knocking their bulbs together till the adhering earth fall off.

EXPERIENCE has amply demonstrated the necessity of cutting off the leaves and tap-root (provincially called topping and tailing), and ascertained the place where those operations should be performed. The section should be made

close to the bulb. If the bulb itself be wounded, rottenness is then apt to ensue, and, though it should be prevented, a quantity of the juices oozes out proportioned to the extent of the wound. The tap root is disliked by all animals, as its acrid quality occasions an immoderate discharge of bile, with its natural consequences, gripes and looseness. When any part of the leaves is left, turnips are liable to vegetate on receiving a slight degree of heat. As it is impossible, in practice, always to hit the point of excellence, and to perform the section with mathematical exactness, the operators should be careful to err on the safe side, to leave part of the leaves or root, rather than to injure the bulb, as it is wiser to run the hazard of a slight vegetation than of entire putrefaction.

I. THE earliest method of storing turnips, was to secure them under a roof, as it seemed but an extention of a practice, previously common, of laying in, in fresh weather, a quantity of turnips sufficient for the consumpt of several weeks. The disadvantages of that method soon became evident. It was necessary to pile large quantities to find house-room for the produce of an incon-

siderable field ; and turnips, in that situation, spontaneously heated and putrefied. There is even danger in housing small quantities. The heat communicated through a partition wall from the fire of an adjoining apartment, and the breath of cattle, if they have access to the store of turnips, are sufficient to commence and to support a vigorous vegetation. The sprouts exhaust the substance, and corrupt the juices of those turnips from which they rise ; and, pushing up between those turnips which are laid uppermost, moisten them with their succulent stems, exclude fresh air, by filling up the interstices, and speedily reduce the whole heap to a putrid mash.

2. IT is well known, that by pitting potatoes in the field, their flavour is better preserved, and their vegetation is longer prevented, than by storing them in the house. From the resemblance between them and turnips, it has been analogically concluded, that the same practice might advantageously be extended to the latter. Those who have tried the storing of turnips in pits, even in the driest situations, have not, however, been successful. In a few weeks after they are stored in that way, the height of the pit generally sub-

sides; and, in some well attested cases, almost a total loss was sustained.

3. From those experiments, this conclusion results, that turnips, to be preserved, during winter, from running into the extremes of vegetation or putrefaction, require a considerable exposure to the air. On this principle is founded the present common practice of placing the depot in a well-aired situation, adjoining to the feeding byre, and of protecting it with nothing but a covering of straw. The store-heaps, for conveniency, are commonly placed in the barnyard. The turnips are laid down, cart thick, in the form of a narrow tapering ridge; the breadth is about five feet, the height is about four, and the length is perfectly immaterial; the depot is covered with a thick thatch of straw, and this thatch is finally secured with ropes. Common turnips, stored in this manner, are kept in good preservation till the middle of April. Some intelligent farmers have begun to make alterations, and, it is asserted, improvements, on this practice. They pay more attention to the dryness of the situation, than to its nearness to the feeding byre, in choosing a spot for the depot; but the

bottom well with straw ; erect a three-bar paling, or place sheep flakes all around, inclining outwards, that the water-drop may be set off ; raise the top of the heap as high as the turnips will lye, and thatch the whole with straw in the usual manner. In this case the angle at the top is acute, as the turnips can easily be piled up considerably above what is called the *square* of a house roof. The depot is about seven or eight feet in breadth at the base, and may safely be continued to any length required for holding the whole. In recommendation of this plan, there is a probability that turnips are better preserved, and a certainty that less straw is required for thatch in it than in the common practice.

WITH regard to Swedish turnips, the same principles are applicable to them, and they are stored in a similar manner. From their superiority in hardness, they admit of considerable latitude in the season of storing, and in the dimensions of the store-heap. Under this treatment they are easily preserved uncorrupted for a great length of time.

THE advantages which attend the storing of turnips may now be described.

1. *STORING as a security against frost.*—That turnips are overtaken by frost, and congealed into a lump of ice, during winter and spring, is a frequent occurrence. It is well known that cattle, with no other food but frozen turnips, are in great danger of falling off, instead of improving. They are difficulted to make an impression with their teeth; and no sooner have they swallowed a mouthful, than they discover symptoms of universal uneasiness, raise their backs, draw in their feet, and fall a-trembling as if seized with the cold fit of an ague. It is universally admitted, that the storing system affords complete security against those evils: but it is equally certain, that the same advantage is attained, in many situations, without storing, and without any great degree of foresight or management.

IN the beginning of winter, turnips are not affected by a slight degree of frost. Before it produces on them any sensible effect, the cold must be so intense as to form, on water, a pretty thick film of ice. The cause of this is obvious.

By the close of autumn, if the turnips have been properly set out by hand-hoeing, their leaves must form a close mantle over the whole field; and this natural covering protects the bulbs from the first attacks of frost. From this circumstance it follows, that the most improvident farmer, whose cattle are only supplied day by day from the field, will sustain little damage from the transient frosts which usually precede Christmas. After that time, he will be compelled to adopt the precautions employed by his wiser neighbours, of laying in, during fresh weather, a quantity of turnips that will supply his consumption for two or three weeks. It is seldom that our frosts outlast that period. If they should continue longer, and if the stock of turnips is exhausted, it will be necessary to adopt a practice, often successfully tried in Tweeddale, and almost universal in the more southern counties, of raising them frozen in the ground, and from thawing them in a running stream, or in a drinking pool. The turnips are raised with an instrument formed for the purpose, a fork with two prongs, slightly curved inwards, and set perpendicular to the handle. Towards evening, they are carted from the field, and emptied into the pool. The com-

mon practice is to leave them under water till next morning: but an immersion for two hours is found sufficient. When taken out, they are as fresh and sound as if they had never been frozen.

FROM the preceding statement, it may be concluded, that, in the most fertile districts of Scotland, where the climate is more genial, and the weather, more uniform, the storing system possesses little essential advantage, in point of security against frost, over the practice of leaving turnips on the ground. A little foresight will, in most cases, supersede the necessity of raising them in a frozen state, and, even then, immersion in water is an easy and effectual remedy. It is impossible, however, to adopt this practice, probably, in the Highlands of Scotland, and in many districts of the southern counties. The frosts there set in early, are severe, and lasting. During the whole winter, there are almost continued storms of frost and snow, which must prevent turnips from being regularly carried off the field to the bestial. It is found that turnips, piled together in a house, begin to decay after three weeks; and, therefore, a stock of turnips,

equal to the consumpt of that period, is the utmost that a farmer can provide against the contingency of frost. If the frost outlast that time (which is not an uncommon event), recourse must be had to turnips from the ground; but it is very difficult to raise them during intense frost, such as often occurs in winter, in elevated districts. A turnip, thoroughly congealed, when struck with an iron tool, will fly into splinters. A pick-axe is necessary to raise it from the ground, and, even with it, great care is required to raise the turnip whole. We have been informed that a farmer, in an elevated district of Tweeddale, being under the necessity of recurring to his turnip field during an intense frost, found as much difficulty in raising the produce of a few yards, as he would have had in storing his whole crop at the proper season. It may thence be concluded, that, though the storing system is not so necessary in low-lying districts, as a security against frost, it is eminently advantageous in more elevated and exposed situations, by rendering the farmer independent of the severities of the weather, by enabling him at all times to supply his cattle with sound and nutritive food.

2. *STORING as a preventive of putrefaction.*— Turnips, left on the ground, are liable not only to be congealed into a lump of ice, but also to be reduced into a putrid mash by the inclemencies of the weather. The practice of storing, since it has been rightly understood, prevents any loss from putrefaction: it has thence been concluded, that this circumstance is a decided advantage in favour of that system. On examining the matter more closely, and contrasting the loss on the ground with the loss in the process of storing, there will appear abundant reason to modify, perhaps to reject, this conclusion.

It is impossible to form a general estimate of the quantity of turnips annually destroyed. The loss is so variable, being affected considerably by the soil and exposure of the field, though regulated principally by the climate and the season, as to defy the most sanguine calculator. It is even difficult to approximate to the truth; as the opinions of farmers, on this subject, from the difference of their circumstances, are vague and contradictory.

It consists, however, with the experience of every farmer, that turnips suffer little or no injury till the approach of spring. We are convinced that the effects of the weather are not underrated, when it is stated, that, on an average of years, even in an elevated district, one-third of the turnips on the ground at Candlemas only is destroyed by frost. It is presumed, that two-thirds of the crop are consumed during the three months of winter, and without any material loss. The third, which remains on the ground till spring, is the only part which suffers; consequently the annual loss, at an average, may be stated at one-third of one-third, or at one-ninth of the whole crop.

THERE is every probability that a considerable loss is sustained by the practice of storing. After lying some time in the store-heap, turnips shew evident indications of decay. To the eye they seemed shrivelled; to the hand they feel lighter. It is the common sentiment of all who have tried the experiment, that turnips in a store-heap lose one-third of their weight before spring—a loss equal to what may be estimated as sustained by turnips when left in the field. Besides this ine-

vitable, there is another probable disadvantage attendant upon storing. The turnips must be carried off the field soon after, commonly immediately after harvesting the potatoes; their further growth is prevented: whereas, had they been left on the ground, they would certainly have increased in size, probably matured and improved their juices, till interrupted by the severity of winter. But, perhaps, the strongest objection to the storing system is the circumstance, that turnips, however carefully stored, are less palatable to cattle than when taken fresh from the ground. That this inferiority is real, and considerable, was satisfactorily evinced by an experiment made in presence of the Eddleston Farmer's Club. Two quantities of turnips were there produced in the first week of March, the one from a sound store-heap, and the other fresh from the field. Several cows were turned out successively to prove them, and all, after smelling at both, began to eat the turnip from the field till it was finished, the other not being touched. This inferiority cannot be referred to a diminution of succulence (for it was discovered by the sense of smelling), but to a putrescent flavour, arising probably from the operations of *topping and tailing*. Though the

leaves and tap-root were cut off with mathematical precision, still two considerable wounds must be made on each turnip. The juices ooze out at those wounded parts; and fluids, when partly extravasated (if we may adopt medical language), lose their vitality, and run into putrefaction. A putrid crust is thus formed on the surface of each wound, and must be eaten by cattle before they arrive at the sound interior. Of the nature of this injury, some conception may be formed by those persons, who, from the carelessness of their cook, have accidentally seen, or tasted, a potatoe that had been wounded in the process of harvesting.

FROM these observations it is reasonable to conclude, in general, that the severities of the weather occasion less loss than the practice of storing. In favour of the latter, however, there is this great advantage, that the loss is always uniform, and can be foreseen, and provided for; while, in regard to the former, the loss is perfectly uncertain, being regulated by causes which we cannot anticipate, and over which we have no control. This circumstance is often very em-

barrassing to farmers in exposed situations. In some years, if the weather be favourable, the whole crop may escape unhurt by frost; and there may be a superabundance in spring, with no adequate stock of cattle to consume it. On the contrary, if the weather be very severe, almost the whole turnips, intended for spring food, are destroyed, and the farmer will find great difficulty, as well as sustain considerable loss, in disposing of his cattle, before they are fully fattened. It may therefore be imagined, that, in exposed situations, the practice of storing is advisable to a certain extent, say one-third of the crop, that there may always be a certain supply for spring consumpt; but a practice has been introduced, which promises to render even that extent of storing unnecessary, of earthing up the turnips in the drills, with a double mould-board plough, at the end of autumn.

THE cause of putrefaction does not seem to be precisely understood. It certainly is not the frost *per se*. Turnips, congealed into a lump of ice, are perfectly fresh after being thawed in water. In the beginning of winter, they are scarcely affected by a black frost, though very

severe; and even when the season is further advanced, they remain safe during every degree of frost, if the ground is covered with snow. It has also been observed, that a turnip field, with a northern exposure, in all cases, sustains less injury than a field with any other aspect. From these facts, it may be inferred, that the sun acts a part in the destruction of turnips, and that his influence is injurious, by producing a sudden transition from cold to heat. Turnips, in the beginning of winter, suffer little during black frost, because their leaves, then succulent and expanded, intercept completely the rays of the sun; and at the approach of spring, the same event happens, though the leaves are destroyed, if snow afford a covering to the bulbs in their stead. But if a black frost occur at that season, turnips suffer an irreparable injury. They freeze every night; the sun, then pretty high and powerful, thaws them every day. In the morning there is a rapid transition from cold to heat; and in the evening there is a similar transition from heat to cold. It is well known, that a turnip, when wounded, speedily decays: probably these frequent vicissitudes of heat and cold, by producing sudden

alternations of expansion and contraction in turnips, destroy their texture, reduce them to the state of dead matter, and subject them to the general law of putrefaction.

FROM this explanation, it will easily be discovered, in what respect earthing-up is beneficial to turnips. In spring frosts, it shields them from the burning rays of the sun, supplying the place of their natural covering of leaves, or of the accidental protection of snow. A spirited farmer, in an elevated district of Clydesdale, has carried successfully this principle to its utmost extent, by ploughing-under, and wheeling, in the bottom of the furrow, that part of his turnips intended for spring consumption. It is believed that the thick incumbent furrow-slice, and the reversed position of the turnips, considerably retard vegetation at the approach of spring; but this advantage, if it really exist, is certainly counterbalanced by the difficulty of raising them from so great a depth. Even earthing up is sometimes productive of inconvenience in this respect. If the frost be severe, it becomes laborious to raise them with a pick-axe; if the ground be wet, it is difficult to free them from the adhering earth. It seems

necessary, therefore (to supersede, entirely, not only the *necessity*, but also the *convenience*, of the storing system), that a species of turnip were discovered possessing a degree of hardiness sufficient to resist every inclemency of our northern climate, and every vicissitude of our variable weather. In the sequel, some reasons will be produced to shew that this discovery is now made.

3. *Storing as admitting the culture of the more valuable species of turnips.*—Before the introduction of the storing system, its advocates argue, farmers were obliged, in exposed situations, to cultivate not the most valuable, but the most hardy species of turnips. The yellow garden variety was found to possess this property, and, notwithstanding the smallness of its size, was cultivated to a considerable extent, to secure a certainty of spring food. But, under the system of storing, while this advantage is obtained in its full extent, the greatest latitude of selection is admitted, either as to the greater size of the turnips, or as to their greater palatableness to cattle. This argument seemed conclusive. The yellow garden species was laid aside, and the common

white, which is much more valuable, was substituted in its stead. From recent discoveries it seems probable, however, that the storing system is unnecessary to the successful culture of the more valuable varieties. The prejudice in favour of the delicate and eye-pleasing bulk of common turnips, is on the decline. Experience has shown, that the eye is not the best judge, and that bulk is not the surest criterion of excellence in turnips. Facts are rapidly accumulating to encourage a belief, that a species is discovered, hardy, yet valuable, equal to the common in size, and superior to it in nutriment.

4. *Storing, as admitting the introduction of wheat on a turnip fallow.*—From the preceding observations, it seems evident, that the storing of turnips is necessary only in exposed and elevated districts, to attain security against the inclemencies of the weather; and that, in every more favoured situation, it is directly injurious, from requiring turnips to be raised from the ground before they have attained their full growth; from the evaporation of their juices while they lie in the store-heap; and from their acquiring a putrescent flavour, and becoming unpalatable to

cattle. Even in the latter, however, that system is attended with one advantage, which more than compensates its numerous evils,—the facility with which it enables the farmer to introduce wheat on a turnip fallow.

THERE can be no doubt, that a turnip fallow, in most cases, is a sufficient preparation for wheat. A bare fallow seems indispensably necessary only on wet and stubborn clays : but this is a species of soil most unfavourable to the culture of turnips. If they are forced to grow in such a situation, they cannot serve as a substitute for summer-fallow ; and the storing system must be resorted to immediately after harvest, not to make way for sowing wheat, but because it is impossible, in our moist climate, to carry off turnips from such lands during winter. But on a dry soil, of every species from a light sand to a rich loam, which turnips chiefly affect, every advantage of a summer-fallow is obtained by cropping with turnips : The frequent ploughings before the seed process, and the various hoeings, after the plants appear above ground, till they cover it with their leaves, effectually pulverize the soil, and clear it of weeds. On light lands of this

description, if wheat is intended to follow turnips, it may be sown at an early, and at its proper, season. If the process of storing commence immediately after harvesting the potatoes, the ground may be cleared to receive the wheat in the beginning of November. When it is wished, however, to obtain the full benefit of the turnip crop, it will be necessary to delay storing some time longer, till the bulbs arrive at their full size : Yet, even in this case, it will be easy to put the ground in order during the course of winter, and to embrace the most favourable season of sowing it with spring wheat. It is obvious that, if storing be omitted, wheat after turnips is a precarious crop. If the ground is only cleared, as turnips are required for the consumpt of cattle, they must be regularly carried off during the whole of winter, and the beginning of spring. The carriage of such a bulky crop, in our moist climate, and during our wettest season, inevitably occasions a degree of poaching on almost every soil, and greatly retards the operations of ploughing, sowing, and harrowing, in spring. Unless the weather be very favourable, the season is too late for sowing wheat ; and it is considered as more advantageous, in general, to intro-

duce barley or oats after a turnip fallow. The storing system, therefore, is advantageous in the exact proportion that a crop of wheat is superior to a crop of barley ; and this profit must greatly overbalance the various losses which turnips sustain in that process.

From what is said, the storing of turnips, abstractedly considered, appears to be attended with direct and unavoidable loss ; but, when viewed in reference to the climate and agriculture of Scotland, is necessary in unfavourable situations, and eventually advantageous in every other ;— necessary in high lands, where the severities of winter prevent turnips from being regularly carried off the ground to supply the consumpt of cattle ; and advantageous, in low lands, by enabling the farmer to introduce wheat after turnips, where he could otherwise obtain only a crop of oats or barley.

On Cabbages.

THOUGH we have advocated the cause of turnips with a degree of keenness adequate to the

merits of the several varieties of which the family is composed, yet it is out of our power to bestow the like support upon cabbage culture, because we view it as much more hazardous, far less profitable, and attended with infinitely more trouble than that of turnips, while the advantages to be derived from them are not, in our opinion, of a description to compensate the extra hazard and trouble thereby incurred. Cabbages have always been a rare article with the farmer, and it is to be hoped they will long continue to be so. Scarcely any plant requires more manure; and none will scourge the ground more effectually. Not wishing, therefore, to encourage the cultivation of cabbages, except in gardens, we shall dismiss the subject without any further investigation.

On Carrots.

WE cannot say much more in favour of the carrot, than we have done of the cabbage husbandry. In fact, both are troublesome articles, and not to be thought of by actual farmers, who must remember term-time; though both may be

highly amusing and interesting to gentlemen who have no rent to pay, and whose welfare depends little upon the profit or loss arising from the mode of cropping exercised, or the value of the crops obtained. To this class of agriculturists we may say, that carrots require a rich and soft soil; that deep ploughing ought to be given to the ground before the seeds are sown, and that they ought to be drilled and carefully hoed.

On Lucern, Burnet, and St Foin.

THESE green crops have often been greatly extolled; but the small progress hitherto made in their cultivation, abundantly justifies the conclusion meant to be drawn, viz. that the climate of the British isles is unfriendly to their growth. In fact, with none of them will the like weight of crop be obtained as with good clover and ryegrass; and, this being the case, it need not excite wonder that agriculturists should continue to use the plants which yield them the most bountiful return, and avoid exotics not suited to our climate.

THE ancient Roman writers speak much in commendation of lucern, by them called *Medica*; but whether it got this name from being used as a medicine for sick cattle, or because it was originally brought from the kingdom of Media, is uncertain. Columella states, that one sowing will last for ten years, and that it ought to be cut four, often six times, in a season. He adds, that it enriches the land, fattens all kinds of lean cattle, is a remedy for those that are sick; and that one jugerum (three-fourths of an English acre), will completely feed three horses for a whole year. Palladius speaks nearly to the same purpose in its praise; and so does Pliny, with this difference, that he asserts it will last thirty years. These, to be sure, are important matters, though we entertain doubts whether such crops as are mentioned by these writers could at this time be realized in the climate of Italy, far less in the inferior one of Great Britain. When Mr Du Hamel, a great admirer of lucern, speaks of feeding horses of an ordinary size, with five or six pounds weight of it per day, we are almost tempted to smile. The writings of this gentleman, and his friend M. Lulli de Chateaufieux, are amply filled with commendations of lucern;

but we must leave such people as are fond of exotic grasses to learn from these writers what are their respective merits and properties.

IN favour of burnet not much more can be said than of lucern. San-Foin has, however, been sown more extensively than burnet in some parts of England, and with much greater success. Chalky loams and gravelly soils on a calcareous bottom are most proper for this grass. It is more adapted to hay than pasture; and much heavier crops of this grass are obtained from thin lands than when clover is sown. In short, we consider San-Foin to be a hardy kind of grass, well worth the attention of cultivators in upland districts, where the soil is obdurate and shallow, and where clover and rye-grass can with difficulty be raised to such a height as to stand the scythe. When sown, fresh seed ought constantly to be used, as the vegetation of old seed cannot be depended upon. Four bushels may be used for an acre; and great care ought to be taken to cover the seed well, and to put it deeper into the ground than the seeds of other grasses.

SECT. IV.

On Crops used in Manufactures.

THREE other green crops remain to be treated of; namely, hemp, flax, and hops. None of these, however, can be viewed as improving crops; on the contrary, they may be characterised as robbers, that exhaust the soil, and return little, or rather no manure for restoring it to fertility. They are, however, all necessary articles; and, in the present state of public affairs, the culture of the two first, viz. hemp and flax, may be considered as materially connected with national prosperity.

On Hemp.

THIS is a plant of the herbaceous fibrous-rooted kind, which has a thick strong stem, that rises to a considerable height, and affords a rind or covering of a firm strong texture, that is valuable for the purpose of being manufactured into cloth, cordage, &c.

THE soils most suited to the culture of this plant, are those of the deep, black, putrid, vegetable kind, that are low, and rather inclined to moisture, and those of the deep, mellow, loamy, or sandy descriptions. The quantity of produce is generally much greater on the former than on the latter; but it is said to be greatly inferior in quality. It may, however, be grown with success on lands of a rich and fertile kind, by proper care and attention in their culture and preparation.

IN order to render the ground proper for the reception of hemp, it should be reduced into a fine mellow state, and perfectly cleared from weeds, by repeated ploughing. When it succeeds a grain crop, the work is mostly accomplished by three ploughings, and as many harrowings; the first being given immediately after the preceding crop is removed, the second early in the spring, and the last, or seed-earth, just before the seed is put in. In the last ploughing, well-rotted manure, in the proportion of fifteen or twenty, or good compost, in the quantity of twenty-five or thirty-three cart loads, should be turned into the land; as without this good crops can seldom be procured. The surface of the

ground must be perfectly flat, and left free from furrows if possible ; as by these means the moisture is more effectually retained, and the growth of the plants more fully promoted.

Seed, and Method of Sowing.—It is of much importance in the cultivation of hemp crops, that the seed be new, and of a good quality, which may in some measure be known by its feeling heavy in the hand, and being of a bright shining colour.

THE proportion of seed commonly used is from two to three bushels, according to the quality of the land ; but, as the crops are greatly injured by the plants standing too closely together, two bushels, or two bushels and a half, may be a more advantageous quantity.

As the hemp plant is extremely tender in its early growth, care should be taken not to put the seed into the ground at too early a period, as it is easily injured by the effects of frost ; nor to protract the sowing to so late a season, as that the quality of the produce may be lessened. The best season, on the drier sorts of land, in the

southern districts, is probably as soon as possible after the frosts are over in April, and on the same descriptions of soil, in the more northern ones, towards the close of the same month, or early in the ensuing one. But, when the ground is more inclined to moisture, it may be a better practice to delay the sowing to a later period in both cases, choosing, if possible, a time when the land is neither too dry nor too moist for performing the business. Sowing as early as possible is, however, in general, to be preferred; as, in this case, the crops become strong and vigorous in the early part of their growth, and the hemp is found to stand the various operations that are afterwards to be performed upon it in a better manner.

THE most general method of sowing hemp is in the broadcast way, the seed being dispersed over the surface of the land in as even a manner as possible, and afterwards covered in by means of light harrowing. It is probable, however, that, in many cases, especially where the crops are to stand for seed, the drill method, in rows at small distances, might be had recourse to with advantage; as, in this way, the early growth of the

plants would be more effectually promoted, and the land be kept in a more clean and perfect state of mould, which are circumstances of importance in such crops. In whatever method the seed is put in, care must constantly be taken to keep the birds from it for some time afterwards.

HEMP is frequently cultivated on the same piece of ground for a great number of years, without any other kind of crop intervening; but, in such cases, manure must be applied, with almost every crop, in pretty large proportions, to prevent the exhaustion that must otherwise take place. It may be sown after most sorts of grain crops, especially where the land possesses sufficient fertility, and is in a proper state of tillage.

After-Culture.—As hemp, from its tall growth and thick foliage, soon covers the surface of the land, and prevents the rising of weeds, little attention is necessary after the seed has been put into the ground, especially where the broadcast method of sowing is practised; but, when put in by the drill machine, a hoeing or two may be had recourse to with advantage in the early growth of the crop.

IN this culture of this plant, it is particularly necessary that the same piece of land should contain both *male* and *female*, or what is sometimes denominated *simple* hemp. The latter contains the seed.

WHEN the crop is ripe, which is known by its becoming of a whitish yellow colour, and a few of the leaves beginning to drop from the stems, which happens commonly about thirteen or fourteen weeks from the period of its being sown, according as the season may be dry or wet, the first sort being mostly ripe some weeks before the latter;—the next operation is that of taking it from the ground, which is effected by pulling it up by the roots, in small parcels at a time, by the hand, taking care to shake off the mould well from them before the handfuls are laid down. In some districts the whole crop is pulled together, without any distinction being made between the different kinds of hemp; while, in others, it is the practice to separate and pull them at different times, according to their ripeness. The latter is obviously the better practice; as, by pulling a large proportion of the crop before it is in a proper state of maturity, the

quantity of produce must not only be considerably lessened, but its quality greatly injured, by being rendered less durable. The expence of this operation varies considerably in different districts. In some it amounts to eighteen or twenty shillings, while in others it is equally well performed for eleven or twelve. After being thus pulled, it is tied up in small parcels, or what are sometimes provincially termed *baits*.

WHERE a crop of this kind is intended for seeding, it should be suffered to stand till the seed comes to a perfect state of maturity, which is easily known by the appearance of it on inspection. The stems are then pulled and bound up, as in the other case, the bundles being set up in the same manner as grain, until the seed becomes so dry and firm as to shed freely. It is then either immediately thrashed out upon large cloths for the purpose in the field, or taken home to have the operation afterwards performed.

THE after-management of hemp varies greatly in different places where its culture is encouraged. In some, it is the practice only to, what is called

dew-ripen, or *ret* the produce; while, in others, the general custom is to *water-ret* it.

IN the former method, the hemp, immediately after being pulled, is carefully spread out in a very even, regular, and thin manner, on a piece of level old pasture, on which it is to remain for five, six, or more weeks, according to circumstances, being occasionally turned during the time. When the weather is showery, this is mostly done three times in the week; but, in other cases, twice is commonly sufficient. When the rind or hempy substance becomes easily separable from the woody part or stem, it is taken up and tied into bundles, either to be stacked up on the spot, or carried home and placed in some convenient situation, where it may remain until it can be manufactured. In this process, which is termed *grassing*, great attention is requisite to prevent the texture of the hemp from being injured by its remaining too long on the grass.

BUT the latter practice is much better, and more expeditious, as well as more general. In this, the hemp, as soon as pulled, is tied up in small bundles, frequently at both ends. It is

then conveyed to pits, or ponds of stagnant water, about six or eight feet in depth, such as have a clayey soil being in general preferred, and deposited in *beds*, according to their size and depth; the small bundles being laid both in a straight direction and across each other, so as to bind perfectly together; the whole being loaded with timber, or other materials, so as to keep the beds of hemp just below the surface of the water: the produce of an acre, or three small waggon loads, being in some instances piled in one bed. But, as the action of the atmospheric air is essentially necessary to produce that degree of putrefaction, which is requisite for destroying the small fibres and vegetable gluten, by which the bark or hempy substance adheres to the *bun* or stem, it may be more advantageous to build them in much smaller beds; as, by such means, the business may not only be more expeditiously accomplished, but the danger prevented, of rotting the hemp too much. On the same principle, the depth of the ponds should not exceed the dimensions given above. It is not usual to water more than four or five times in the same pit till it has been filled with fresh water. Where the ponds are not suffi-

ently large to contain the whole of the produce at once, it is the practice to pull the hemp only as it can be admitted into them; it being thought disadvantageous to leave the hemp upon the ground after being pulled. It is left in these pits four, five, or six days, or even more, according to the warmth of the season, and the judgment of the operator, on his examining whether the hempy material readily separates from the reed or stem; and then taken up and conveyed to a pasture field, which is clean and even, the bundles being loosed, and spread out thinly, stem by stem, turning it every second or third day, especially in damp weather, to prevent its being injured by worms or other insects. It should remain in this situation for two, three, four or more weeks, according to circumstances, and be then collected together when in a perfectly dry state, tied up into large bundles, and placed in some secure building, until an opportunity is afforded for breaking it, in order to separate the hemp. By this means, the process of *grassing* is not only shortened, but the more expensive ones of breaking, scutching, and bleaching the yarn, rendered less violent and troublesome. Besides, the hemp managed in this way sells

much dearer than when the former method is adopted. After the hemp has been removed from the field, and the business of *grassing* properly performed, it is in a state to be broken and swungled; operations that are mostly performed by common labourers, by means of machinery for the purpose, the produce being tied up in bundles of one stone each. The refuse, collected in the latter processes, is denominated *sheaves*, and is in some districts employed for the purposes of fuel, being sold at twopence the stone. After having undergone these different operations, it is ready for the purposes of the manufacturer.

On Flax.

FLAX has been sown in Britain from time immemorial, though a sufficient quantity has not hitherto been cultivated to supply the wants of the inhabitants. Whether the British climate is unfavourable to the growth of this article, or whether the constant demand for bread-corn prevents a due space of ground from being devoted to its growth, are questions unnecessary to be discussed in this work; suffice it to say, that,

notwithstanding national liberality has stepped forward to promote the growth of flax, and offered premiums of considerable value both upon flax and the seed produced, still the trade is unprosperous, and not carried on to such an extent as to supply one-half of the demands of our manufacturers. That this is the fact cannot be denied; though it is equally true, that a great part of British soil, the alluvial sort particularly, is well qualified for raising this crop in perfection, were the genius and disposition of cultivators bent that way, and no impediments allowed to stand in the way of its culture.

FLAX is not a severe crop on the soil when pulled green, as it ought to be, if an article of good quality is wished for; though, when allowed to stand for seed, it is as severe a scourge as can be inflicted. The soils most suitable for flax, besides the alluvial kind already mentioned, are deep and friable loams, and such as contain a large proportion of vegetable matter in their composition. Strong clays do not answer well, nor soils of a gravelly or dry sandy nature. But, whatever be the kind of soil, it ought neither to be in too poor nor in too rich a condition; be-

cause, in the latter case, the flax is apt to grow too luxuriant, and to produce a coarse sort ; and, in the former case, the plant, from growing weakly, affords only a small produce.

Preparation.—When grass land is intended for flax, it ought to be broke up as early in the season as possible, so that the soil may be duly mellowed by the winter frosts, and in good order for being reduced by the harrows, when the seed process is attempted. If flax is to succeed a corn crop, the like care is required to procure the aid of frost, without which the surface cannot be rendered fine enough for receiving the seed. Less frost, however, will do in the last, than in the first case ; therefore the grass land ought always to be earliest ploughed. At seed time, harrow the land well before the seed is distributed, then cover the seed to a sufficient depth, by giving a close double time of the harrows. Water-furrow the land, and remove any stones and roots that may remain on the surface, which finishes the seed process.

Quantity of Seed.—When a crop of seed is intended to be taken, thin sowing is preferable, in

order that the plants may have room to fork or spread out their leaves, and to obtain air in the blossoming and filling seasons. But it is a mistake to sow thin, when flax is intended to be taken; for the crop then becomes coarse, and often unproductive. From eight to ten pecks per acre is a proper quantity in the last case; but when seed is the object, six pecks will do very well.

Time of Pulling.—Different opinions are held with respect to the period when flax can be most profitably pulled; but, generally speaking, it is the safest course to take it a little early, any thing wanting in quantity being, in this way, made up by superiority of quality; besides, when pulled in a green state, flax is not a scourge, though this objection has been urged a hundred times against its culture. When suffered to ripen its seed sufficiently, there is no question but that flax is a severe crop, though not much more so than rye-grass, when allowed to stand till the seed arrives at perfection. But as there is no necessity for allowing any great breadth of flax to remain for seed, the benefits to be derived from this crop are numerous, while the evils attending

it are only partial, and might be done away altogether were sufficient care bestowed. Were flax for seed only sown on particular soils, for example on new broke up moors, no detriment would follow; because these soils are fresh, and in the first instance will produce excellent seed, even of superior quality to what can be raised on lands of three times more value, when applied to corn culture. We have repeatedly ascertained the fact by experiment, and found the seed to be excellent, much better than when raised upon richer soils, where flax was taken as a crop.

Method of Watering.—When flax is pulled, it ought to be immediately put into the water, so that it may part easily with the rind or shaw, to fit it for the manufacturer. Standing pools, for many reasons, are most proper for the purpose, occasioning the flax to have a better colour, to be sooner ready for the press, and even to be of superior quality in every respect. When put into the water, it is tied up in *beets*, or small sheaves; the smaller the better, because it is then most equally watered. These sheaves ought to be built in the pool in a declining upright posture, so that the weight placed above may keep the

whole firmly down. In warm weather, ten days of the watering process is sufficient; but it is proper to examine the pools regularly after the seventh day, lest the flax should putrify or rot, which sometimes happen in very warm weather. Twelve days will answer in any sort of weather; though it may be remarked, that it is better to give rather too little of the water, than too much, as any deficiency may be easily made up by suffering it to lie longer on the grass, whereas an excess of water admits of no remedy. After lying on the grass for a due time, till any defect of the watering process is rectified, flax is taken up, tied when dry in large sheaves, and carried to the mill to be switched and prepared for the heckle. Switching may also be performed by hand-labour; though in this case it is rarely so perfectly accomplished as when machinery is employed.

FROM the details already given, it appears that the flax-trade is attended with many difficulties, and that considerable labour and industry must be bestowed betwixt the sowing of the seed and the period when the article is fitted for disposal in the market. These operations, perhaps, are

inconsistent with the ordinary occupations of a farmer, and suggest the propriety of dividing labour, and separating the raising of flax from the culture of other crops. The farmer may sow the land; but there his labours ought to cease. The assistance of another person ought then to be employed, and the processes of pulling, watering, and switching, be executed under his management. This we believe to be the Dutch and Flanders method; and unless some system of that nature is adopted in Britain, flax husbandry will never thrive, nor become a staple trade in the hands of a corn farmer.

ABOUT twenty-five years ago, this article was extensively raised in East Lothian merely for the seed, which was sold to other districts. It was, for that purpose, sown upon fresh moors, and a handsome return was generally received from land comparatively of little value. The zeal, however, of those, who attempted this new method of raising flax, was damped by the difficulty, which often occurred, of finding purchasers; and it does not appear that it will soon be revived. Seed, however, was raised of a quality equal, if not superior, to that imported from Holland;

but the prejudice in favour of foreign seed must be removed, before that which is raised at home can find a ready market. That a partial renewal of seed may be necessary, will not be disputed; but that it ought to be imported every year seems highly absurd. Some farmers have sown flax-seed, raised on their own land, for ten successive years, without perceiving any degeneracy; and why it should be otherwise with this, than with seeds of other kinds, cannot be explained. When a degeneracy, however, takes place, a change is certainly requisite; but an annual importation must be regarded as a public loss. The money, undoubtedly, in this manner sent out of the country, might be applied to a better purpose.

BEFORE we leave this article, an observation may be offered, which most of our readers will agree to be well founded; namely, that the legislature of the country has paid more attention to framing laws, or regulations, regarding the husbandry of flax, than any other branch of rural economics. It is well known, that the venders of flax-seed in this country are obliged, by law,

to produce certificates to a purchaser, that the seed sold is not only the growth of a particular country, but also that it was produced in a particular year; and, should any fraud be discovered on the part of the vender, he is severely punishable, according to certain laws enacted for that express purpose. All this may be very well; and we find no fault with it; but if these statutory enactments are right with regard to flax seed, why are they not extended to seeds of every description? Considering the immense quantities of seed grain and seed grasses sent from London annually to every part of the kingdom, and the great losses which farmers, in numerous instances, have sustained, from receiving grain or grass seeds of bad or imperfect qualities, it would be equal good policy were the legislature to establish some regulations, whereby evils so great, and so generally complained of, might in future be avoided. Why attention has not been paid to these matters, whilst the growth and sale of flax-seed has been thought worthy of being regulated by particular statutes, can alone be attributed to the predilection long shewn by the government of Britain to every thing connected

with trade and manufacture. Perhaps the value of grass-seeds sent annually from London, *ten times* exceeds that of all the flax-seeds vended in the island; and yet the greater trade is open and unprotected from frauds, whilst the inferior one is guarded and protected on every hand. The way of carrying on the grass-seed trade of London is well known to most persons. The old seeds on hand, some of them even two, three, and even four years of age, are mixed and remixed together, till qualities of every kind are thereby produced. Sales in the market are never at a stand, even in the middle of summer; and the purchaser to-day, after making a suitable intermixture, will appear in the market to-morrow, and endeavour to gain a profit from the article thus manufactured and prepared. Were certificates required of the age of grass-seeds, matters could not be conducted in this manner, provided that the sellers were liable to heavy penalties when these certificates were contrary to truth. We by no means recommend that the growers and sellers of grass-seeds should be exposed to unnecessary trouble; but surely it can be no hardship upon any man, when he sells an article, to certify the year of its growth. If the purchaser is pleased to consider the seed that

is of the greatest age as the preferable sort, then he has only himself to blame, in the event of his money being thrown away; but give him fair play. Let him know the year of its growth, and whether it is British or foreign seed, and let the rest be trusted to his senses. A very considerable number of farmers are at the best but imperfect judges of the quality of grass seeds; hence they are entitled to some share of legislative protection.

WHEN on this subject, another nearly connected with it may be noticed, namely, the trade in the different varieties of turnip-seeds. It is well known that, four or five years ago, it was scarcely practicable to obtain a pound weight of *ruta бага*, or Swedish turnip-seed, pure and uncontaminated, from any shop whatever; as, owing to the negligence of growers, some communication or other had always taken place with other plants when the blossoming process was going forward. Owing to this circumstance, heavy losses were sustained by many farmers, till at last some of them, more sagacious than others, found that the only remedy was to raise seed for their own supply, in which way the true species

of ruta бага has again been happily restored to agriculturists. Perhaps a recent decision of the supreme court in Scotland will be of eminent advantage to the farming interest. The principles adopted by the court, when deciding upon the cause alluded to, were, that if the purchaser could not make the seller liable for selling seeds of a different description from what he bargained for, the public could have no security whatever that the article wanted could be obtained from the seedsman. Besides, the court seems to have held it to be agreeable to the principles of strict law, that every man who sells a commodity to another at a fair price virtually warrants the commodity as of good quality; and that, if one commodity is sold under the name of another, the seller must be answerable for the consequences.

IN the proceedings alluded to, the supreme court appears to have been guided by sound and correct principles; and their decision, we have no doubt, will be attended with the most happy consequences. The external appearance of many seeds does not furnish a proof of their particular qualities, as evidenced in the fullest manner by

what has happened with some farmers of the first rate abilities, who, even for a great many years, have been in the regular practice of saving these very seeds in considerable quantities. We have seen seed sold for that of turnip, and apparently of excellent quality, which in fact turned out to be a weed of an undescribable nature, and of a species hitherto unknown in this country. In a word, there is no other method of making the grower attentive to the article which he disposes of, but the one lately adopted by the supreme court, which we trust will be followed by the happiest effects.

On Hops.

Hops are a necessary article in brewing, but not advantageous in an agricultural point of view; because much manure is abstracted by them, while little or none is returned. They are an uncertain article of growth, often yielding large profits to the cultivator, and as often making an imperfect return, barely sufficient to defray the expences of labour. In fact, hops are exposed to

many more diseases than any other plant with which we are acquainted ; and the trade affords a greater room for speculation than any other exercised within the British dominions.

WHEN a piece of land is intended to be planted, the first thing is to plough the land as deep as possible, early in October, and to harrow it level ; it is then meted each way with a four rod chain, placing pieces of reed or stick at every tenth link, to mark the place of the hills, which makes 1000 per acre. This is the general method ; but some few grounds are planted 800, and some 1200 per acre ; some are planted wider one way than the other, in order to admit ploughing between the hills instead of digging. But this practice, although it has been tried many years, does not seem to increase, on account of the difficulty of digging along the rows, where the plough cannot go ; that part, being much trodden with the horses in ploughing, digs so much the worse, that an extra expence is incurred, which in some measure defeats the economy of the plan. When the hills are marked out, holes are dug about the size of a gallon,

which are filled with fine mould, and the nursery plants placed in them.

SOME put three plants, others two, and some only one good plant to each hole. If the land is planted with cuttings, instead of nursery plants, the holes are dug in the spring, as soon as cutting time commences. Some fine mould is provided to fill up the holes, in which are placed four or five cuttings, each about three or four inches in length. They are covered about an inch deep with fine mould, and pressed down close with the hand. When the land is planted with cuttings, no sticks are required; but, if nursery plants are used, they require sticks or small poles, six or seven feet high, the first year. In both cases, the land is kept clean, during the summer, by horse and hand hoeing; the next winter dug with a spade; and early in the spring the old binds are cut off smooth, about an inch below the surface; a little fine mould is then drawn over the crown of the hills. As soon as the young shoots appear, so that the hills may be seen, they are stuck with small poles, from seven to ten feet long, in proportion to the length it is expected the bind will run. These poles are

called seconds, and are generally bought in the woods, at from five shillings to eight shillings per hundred, and three of them are placed to each hill. As soon as the bind gets about two feet in length, women are employed to tie them to the poles. The land is kept clean during the summer by horse and hand-hoeing, as before mentioned. The proper time for gathering them is known by the hop rubbing freely to pieces, and the seed beginning to turn brown. They are picked in baskets, containing five bushels each, and are carried to the *oast* in bags, at noon and evening, for drying. Great care and skill are necessary in this branch of the business; the smallest neglect or ignorance in the management of the fires will spoil the hops, and occasion great loss to the planter. When dried, and sufficiently cool to get a little tough, so as not to crumble to powder, they are put into bags or pockets, the former containing two hundred weight and a half, and the latter an hundred and a quarter. They are then trodden very close, and weighed by the exciseman.

THE second year after planting, full-sized poles, from 15 to 20 feet in length, according to

the strength of the land, which cost from 16s. to 36s. per hundred, are placed to the hills instead of the seconds, which are removed to younger grounds. Here great care is necessary not to overpole, for by that means young grounds are often much weakened; and it is equally so not to overdung them, as that will make them mouldy. Fifty cart-loads of well rotted farm-yard dung and mould, once in three years, are generally esteemed sufficient for an acre of land.

Productions.—There can be no certain report made of the produce of the hop plantations; because, in some years, the growth is less than two hundred weight per acre, and in others it is fourteen or fifteen; the average may be seven or eight.

CHAP. IX.

ON GRASS HUSBANDRY.

IF the introduction of turnips occasioned a revolution in the rural arts of Britain, that of artificial grasses produced a change of no less importance at an earlier period. It is difficult to fix upon the time when clover, and other artificial grasses, were introduced into this island; though it may reasonably be inferred that the period was during the reign of Queen Elisabeth, when the nation had almost a constant and regular intercourse with Holland and the provinces of the Netherlands; at least, we are certain that, during the Protectorate, when Blythe published his treatise on agriculture, artificial grasses were well known in England. Many years, however, elap-

sed before they travelled northward to Scotland, such articles being hardly known by the husbandmen of that country when the two nations were united into one empire; nay, it is not more than forty years since they came to be generally used; though, at this time, they are sown in greater quantities by the farmers of Scotland than by those in the neighbouring country.

It is not difficult to account for the predilection of Scottish farmers for artificial grasses. The alternate husbandry is more sedulously followed out by them than by the great body of farmers in England. Comparatively speaking, there is a small quantity of old pasture or meadow land in Scotland; whereas, in England, immense tracks of old grass are to be found almost in every district. Besides, the soil and climate of Scotland require that grasses be often renovated, otherwise the produce, in most cases, is regularly lessened, in proportion to the age of the particular grasses cultivated. These things, duly considered, will account for the strong predilection shewn by Scottish farmers for artificial grasses, and why alternate husbandry is more assiduously exercised by them than by English husbandmen,

SECTION I.

On Grasses for Cutting.

WE are unacquainted with any variety of grass, that will yield a greater return to the farmer, when cut by the scythe, than broad or red clover mixed with a small quantity of rye-grass. The first mentioned may be regarded, in most cases, as the parent which produces the crop, and the other only in the light of an assistant or nurse, that serves to train up the crop to maturity, and to protect it from rude blasts and inclement storms. Fine soils alone are calculated to produce a heavy crop of grass, when clover is only used as the seed plant; but, when a small quantity of rye-grass is sown along with the clover, it is wonderful what weight of crop may be obtained, even from inferior soils, when the seeds are

sown at a proper season, and on land in good order and condition. Some people make a greater mixture, and add a portion of white and yellow clover; but the addition is unnecessary when a cutting crop only is meant to be taken; and we are convinced, that grass cut in one year ought to be ploughed in the next, otherwise a crop of inferior value will certainly be obtained. Laying this down, therefore, as a fixed rule, we consider sixteen pounds weight of red or broad clover, and two pecks of rye-grass seed, as a full allowance for a Scottish acre of ground, which, as already stated, is one-fifth larger than English statute-measure. The seeds, to ensure a good crop of grass, ought always to be sown with a fallow crop; and, if with winter wheat, great care ought to be used to cover them properly, even though the welfare of the wheat should be hazarded by the harrowing process; if with spring wheat or barley, the grass seeds should be sown at the same time with these crops, none of which ought to be thickly seeded, so that the grasses may not be smothered or destroyed. Unless in very favourable seasons, and when the grass has grown to a great length at harvest, neither sheep nor cattle ought to be allowed to

set a foot upon the stubbles ; and, next spring, the ground should be carefully stoned, and afterwards rolled, so that the scythe may run smoothly upon the surface. and cut the crop as close as possible. The closer the first crop is cut so much faster will the second one rush up, and so much thicker will the roots set out fresh stems, and thus produce a weighty aftermath. To cut the aftermath with the scythe is also the most profitable way of using it ; because a great quantity of food is thereby provided for live-stock, and a large increase made to the dunghill. It must be remembered, however, that after these cuttings, it is necessary to plough the land again ; because the roots of the plants will rot in the succeeding winter, at least many of them will do so, and of course a small crop of grass will afterwards be obtained, whether the scythe is used again, or pasturage resorted to.

SECT. II.

On the Methods of Consuming Cut Grass.

CLOVER and rye-grass, sown for a cutting crop, may be used in various ways : 1. As green food for the working-stock. 2. For fattening cattle, either at the stake, or kept in a court or farm-yard. 3. For hay. On each of these points we shall say a few words.

1. As green food for the working stock, clover and rye-grass may be used with great advantage when in a succulent state ; and, when cut fresh, and furnished regularly, the animals will thrive equally well as if allowed to roam at large, while at least one-half less ground is required to support them in the former case than in the latter. Besides, horses kept in this way are always at

hand, and ready for service. They are not injured, as in the field, by galloping about and kicking at each other ; nor is their dung lost, as it is, in a great measure, when they roam at large ; but it is preserved in a moist heap, the straw used for litter being saturated with the water, which, when on this food, they make in great quantities. Indeed, the practice of soiling horses is now so firmly established in all well cultivated districts, that, to say more in support of it, would be altogether unnecessary.

2. THE next way of using clover and rye-grass cut by the scythe, is to feed cattle upon the grass by tying them up in a shade, or allowing them to run at large in a farm-yard. This is a practice of more recent date than that of feeding horses ; though, by analogy, it may be inferred that, if this mode of feeding answers in the one case, it will do equally well in the other. It is obvious that any quantity of grass may be consumed in this way, to the great benefit of the corn farmer, who generally stands in need of more dung than can be accumulated from the straw of his corn crops ; and it is plain that, in no other way, can a greater quantity of dung be

collected than where this method is adopted, whilst, at the same time, it is of superior quality to every other kind, that from turnip cattle excepted. The practice, to be sure, is attended with some degree of trouble; but this objection will not be urged against its utility by any real husbandman; for, as man must live by the sweat of his brow, the best management necessarily includes the greatest portion of trouble, and, *vice versa*, slovenly and imperfect management is most easily executed.

BUT, as experience and practice, in all such cases, are the best guides, we shall offer to the consideration of our readers the result of a trial which we made to ascertain the advantages of home-feeding in the summer-months, which seems to be decisive in favour of the practice of using grass in the farm-yard, instead of depasturing it with cattle, according to the ordinary method. This mode of feeding has been regularly continued since the experiment was made, and the advantages have been so extensive as to justify its continuance.

WE purchased, in October 1804, at Falkirk tryst, 48 Aberdeenshire stots, mostly of full age, which were wintered in the farm-yard, and divided, on the 4th of May 1805, into two lots, when one lot was put to grass, and the other into the farm-yard, where they got a tasting of ruta бага in addition to their usual fare of straw, till the clover-field was fit for cutting. Before the division, a few turnips had been given to 30 of the best and largest cattle in a separate court ; but, as that parcel was equally divided previous to the remaining 18 being examined, the result is not thereby affected, especially as the turnips and ruta бага are charged against the clover-fed cattle in the after-statement.

ON the 1st of June, clover was given to the cattle in troughs and cribs ; though, for a week at least, to save danger, the quantity given was much less than they could have consumed. After that time, a full supply was allowed, and the offal or waste furnished maintenance for a large parcel of swine of different ages. Till the grass got hard and withered, the cattle in general, after the first fortnight, throve amazingly well, particularly those who had got a few turnips in

March and April. Exceptions there were even amongst them ; for the strongest and boldest cattle generally took possession of the cribs, and would not resign them till their appetite was satisfied. This evil must necessarily happen where any considerable number are kept together, and can only be avoided by having several courts or feeding places, and selecting the cattle for each, according to their size and disposition.

ABOUT the end of July, when the grass was fully ripened, the food was changed, and tares, which were sown in March, were given, and continued till the second crop of clover was ready for the scythe. On the 28th of August, ten of the *tops* were sold, which allowed more justice to be done to those who had hitherto been second in hand. On the 24th of September, the remainder were disposed of ; though, unfortunately, one of them died of a surfeit on the preceding day, which reduced the account of profits nearly at the rate of 10 per cent.

It should have been mentioned, that the farm-yard or *courtine* was regularly littered with straw, which occasioned much excellent dung to be col-

lected. A plentiful supply of water was also at hand ; and the cattle reposed, during the heat of the day, in open shades around the yard, much more comfortably than they could have done in any field whatever. This circumstance is mentioned, because several dealers sagaciously concluded, that the confined air of the court, and the reflection of sunshine from the houses, would keep the cattle so warm as to prevent tallow from being gathered in any quantity. On the contrary, they were better tallowed than beasts of their size, fed for the like time, generally are. The one which died of a surfeit had 4 stone 6 lb. Tron, or 96 lb. Avoirdupois of tallow, and the weight of the carcase was only 34 stone Dutch.

THE profit and loss account of this parcel, which was made up with every possible attention to accuracy, may now be stated, and it is presented merely that the result of the experiment may be sufficiently understood.

Cattle fed on clover and tares

1805.

Dr.

To prime cost at Falkirk and expenses,	-	-	-	-	L.227	11	0
To wintering on straw, at 15s. each	18	0	0				
To proportion of turnips in March and April	-	-	-	-	6	0	0
To 1 ¹ / ₂ acre of ruta бага at 5l. per acre	-	-	-	-	8	15	0
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Total charge when clover-feeding commenced	-	-			L.260	6	0
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Cattle fed on clover and tares

1805.

Cr.

By 10 sold Aug. 28, at 17l. 15s.	L.177	10	0
By 13 sold Sept. 24. at 14l. 5s.	185	5	0
By hide and tallow of the beast that died	-	-	-
		3	18
		0	0
<hr/>			
	L.366	13	0

DEDUCTING the 260l. 6s. when the cattle were put to grass, the net profit was 106l. 7s. besides what was obtained from swine maintained on the offal.

THE clover and tare land, which yielded food for the cattle, extended nearly to eleven acres, viz. eight of clover and three of tares. It may be added, that six acres of the clover were good, and would have produced 3000 stones of hay per acre; the other two were only middling, and could not be estimated as exceeding 2000 stones. Of the tares, one acre or thereby was good, the remainder indifferent. The second crop of clover, owing to the severe drought, was very light.

It may be objected, that nothing is stated for the trouble of cutting and carting the clover and tares; but it is presumed, this was much more than compensated by the great quantity of fine manure accumulated during the process. Had the advice of some people been taken, the profit account might have been considerably augmented, by taking credit on that head; but it was not wished to state it a half-penny higher than could be sufficiently instructed. Indeed, whoever reflects upon the difficulty of converting straw into dung on clay soils, where turnips cannot be raised with advantage, must allow, that a benefit of no small importance is gained from using grass

in this manner, independent of the direct profit arising from the bestial.

HAD it been practicable to run a comparison betwixt the lot depastured in the field, and the one fed at home, the advantages of the latter mode could have been more strikingly displayed; but as the former were mixed with other parcels purchased at different periods, it was impracticable to present a comparative statement, which could have any pretension to correctness. Both lots, however, were sold exactly at the same price, and on the same day, which affords a sufficient foundation for two inferences, *viz.* 1. That cattle will feed equally well on cut meat, if care is taken to furnish them with a full supply in a regular manner, as they will do in the field, when allowed to roam at large: 2. That the saving of grass must be considerable, though we are unable, from the above circumstance, to ascertain the extent of it with precision. However, from the total result on the different parcels of cattle, and other stock depastured, we are inclined to believe, that the saving per acre will amount to 50 *per cent.* or, in other words, that a field of clover and rye-grass will feed one half more

beasts, when cut by the scythe, than when depastured. A caution must, however, be offered to such people as may attempt to feed in the former way, that a very great degree of attention is necessary in every step, otherwise loss, instead of gain, may eventually follow. The yard, in which the cattle are fed, ought to be commodiously fitted up; a plentiful supply of water kept within its bounds; a careful servant provided for management; tares sown in different successions, to come in when the grass arrives at maturity; and fresh provision furnished regularly, at least five times per day. Unless tares are provided when the clover becomes hard and unpalatable, cattle will make no further progress; but having that article of different ages, the process of feeding went regularly forward in the instance mentioned. Some may object, that such a mode of feeding is a troublesome one, and that the old way of allowing the cattle to seek their own food is much more easy and convenient. We grant that a good deal of trouble accompanies home-feeding; but are yet to learn the branch of good management, which can be executed with as little trouble as is sustained when the system is slovenly and improvident. The like objection

was urged against summer fallow on its first introduction ; it was afterwards repeated against the drilling of turnips ; and, in short, every perfect plan is of consequence exposed to it. Perhaps a general adoption of home-feeding would be the greatest improvement that can be introduced on clay soils, which naturally are unfit for the growth of turnips. All such soils require a good deal of manure before they can be farmed successfully ; and where situated at a distance from a large town, no additional supply can be procured. To use resources within their bounds, seems therefore to be sound wisdom, even laying aside all consideration of profit in the first instance. If the clover-break, where a six-course shift is followed, were regularly cut with the scythe, and consumed at home, perhaps every farmer would manure one-sixth more ground annually, than what he is at present capable of doing.

ONE observation occurs, with which these remarks shall be concluded. Cattle intended for home-feeding, should be in decent condition when grass is first given them ; for, if otherwise, the best part of the season, namely, the month

of June, when grass is richest, is over before much alteration can be discovered. It would also be a desirable circumstance to have the main part ready for the butcher, by the time that the first crop of grass becomes hard and unpalatable; for though tares are an excellent succedaneum, yet, considering the difference of produce on a given spot, they are more expensive food; and the second crop of clover contains much less feeding matter, even from the same bulk, than is yielded from the first one.

3. To convert clover and rye-grass into hay or dry fodder, for winter consumption, is another way in which these grasses may be profitably used. It is well known that, in common seasons, the process of winning clover and rye-grass, and making them into excellent hay, is a very simple matter, and that with no other grasses can the hay process be so easily or speedily executed. To cut the plants a little quick, is obviously the best method of procuring good hay, and likewise of the most advantage to the ground; because the plants, not having perfected their seeds, extract from the ground much less of its strength or substance than would undoubtedly be drawn out, were

they suffered to stand till they arrived at maturity. Clover and rye-grass are great improvers of the soil when cut at an early period of the season ; but, if allowed to occupy the ground till their seeds are fully ripened, a different character must be bestowed. In fact, improvement from these varieties of grass is regulated entirely by the time of their cutting ; and, as it is early or late in the season when the cutting process is performed, so will the advantage to be derived from these grasses fall to be ascertained. We here speak of the soil, not of the weight of the crop which may be reaped from it ; though, when the first crop is late, or stands long uncut, the second is rarely of much value.

GRASS, when cut for hay, ought to be quickly put together, so as its powers may neither be exhausted by the sun, nor dissipated by the air. In the first stage small cocks are preferable ; and, on after days, these may be gathered into larger ones, or hand-ricks, by which method the hay is equally made, and properly sweated. After standing eight or ten days in these ricks, according to the nature of the weather, hay may be carted home, and built in stacks of sufficient

size for standing through the winter months. In ordinary weather, the processes of preparing hay and bringing it into good condition, are easily executed, though, in bad weather, few branches of rural economy are attended with more vexation, or performed with more difficulty. If this is the case with clover and rye-grass, the hazard and trouble are ten times greater when natural or meadow grasses are made into hay. In a wet season, these are rarely preserved in a healthy condition ; and, in the very best, much more attention and work are required than when artificial grasses are harvested.

SECT. III.

Of Grass when consumed by Live-Stock.

PASTURAGE is the ancient and common method of consuming grass ; and, as many soils do

not yield crops which can be consumed in any other way, it obviously must continue to be followed as the best way by which live-stock can in general cases be fed or supported. We are decided advocates for the soiling system in certain situations, but not so bigotted as to contend for the use of that system upon every soil and in every situation; because natural impediments are often in the way, which render the system unprofitable and inexpedient. Upon certain soils, and in particular situations, pasturage must be adopted, because the grasses raised are unfit for the scythe, and will not defray the trouble and expence of gathering them together, preparatory to being used in home-feeding.

THIS is the case with many of the upland districts, and with thin soils, wherever they are situated. To land, under these circumstances, the preceding observations are confined; but there are many fields of old grass in the richest districts where cutting by the scythe cannot be recommended. It is, however, a very common practice in England to hay such fields, though no doubt can be entertained concerning the impropriety of the practice. The soil is not only rob-

bed thereby of its powers, but the roots of the plants are exposed to destruction in the subsequent winter season. In a word, haying and pasturing of land are practices diametrically at variance with each other; and the scythe ought never to enter a pasture field unless it be to cut weeds. Were artificial grasses sown in the districts where hay is taken on old pasture lands, there would not be the slightest necessity for cutting them with the scythe; but, as one defect generally causes another, so the neglect of artificial grasses is the real cause why the old pastures are so grossly mismanaged, in order that the first omission may in some measure be rectified and supplied.

BESIDES, the grasses most fit for the scythe are not best calculated to make good pasturage; nor ought seeds, in the first mentioned instance, to be sown so thick as is necessary when the grazing system is to be adopted. We have already said, that red clover and rye-grass are the proper seeds for a crop, either to be used in soiling, or to be manufactured into hay; but, where pasture is intended, white clover should be liberally used. A pasture field can scarcely be too thick planted

at the outset ; because, being constantly eaten down by the cattle, the thickness of bottom is not detrimental, nay rather is advantageous to its after-growth. It is of importance, however, not to put beasts too early in the season upon new grass, and particularly to keep them off when the weather is wet. After the surface is consolidated, less risk of damage is encountered, though at all times pasturing by heavy cattle is attended with evil consequences during wet weather.

WE are friends to alternate husbandry, and therefore hostile to every scheme calculated to keep land in grass constantly, or for any period comparatively long. A few old pastures may be useful for particular purposes ; but, generally speaking, none should exceed the age of five or six years, in a country like Great Britain, where bread-corn is so much in demand, and where a return of value is generally obtained sufficient to defray the expences incurred by alternate husbandry. Perhaps, in many cases, one year in grass is sufficient for every useful purpose ; and we are almost certain that this system, upon a good soil, is the most profitable one that can be adopted when discretionary management is per-

mitted. There are many soils, however, which require to be longer grazed, not on account of the profit obtained by allowing them to remain in that state, but entirely because they will not pay for ploughing, unless freshened and invigorated by grass. The most suitable way of accomplishing these objects is to understock; for the extent of improvement by grass, upon such soils as those alluded to, is regulated entirely by the way in which they are depastured. If eaten bare, and left exposed to a hot sun, or a scourging wind, the roots of the plants are enfeebled, and prevented from flourishing, whilst the surface, deprived of a cover whereby it may be warmed and fructified, continues equally barren and unproductive as when the grasses were originally sown. Another evil of overstocking such soils, and that not a trifling one, is that, whenever artificial grasses become languid and feeble, their place is supplied by the aboriginal inhabitants. Moor-fog, that bane of grass upon thin soils, is sure to take possession of the surface, and to put the ground into a worse condition when ploughing is again attempted, than it was when grass-seeds were sown.

FROM these things, it will appear that a considerable share of judgment is required to manage grass-land; so that the soil may be improved, and the occupier benefited: The last object cannot be accomplished if the first is neglected; hence it often happens, that the grazing trade becomes a bad one when in the hands of injudicious persons. The radical error lies in overstocking; and it is even attended with great risk to stock any way fully, till the nature of each season is in some measure ascertained: From inattention to these matters, a crop of grass may be consumed, without benefiting the owner one-half so much as it might have done under different management. Nay, in some instances, grass has been lost altogether by overstocking, the cattle depastured thereon being little if at all improved at the end of the season. To keep a full bite is the maxim of every good grazier; but this cannot be obtained without understocking, because an adverse season may come on, and blast the fairest prospect

UPON thin soils of every description, sheep are a safer stock than black cattle, because the former will thrive where the latter will starve. An an-

nual stock may also be considered as preferable to a breeding or standing one in all low country districts; and perhaps rearing of lambs for the butcher, and feeding the dams afterwards, is the most profitable way of keeping sheep. These things, however, will be treated of with more propriety in the next chapter.

SECT. IV.

On Breaking up old Grass Land by the Plough, and the most proper Way of managing it afterwards.

THERE is not a single branch of rural practice in which the farmers of Great Britain are more defective than the culture of old grass-land when broken up by the plough, or one where greater improvement may be introduced, than in the processes necessary before the grass-roots are sufficiently destroyed, so that crops of grain

and artificial grasses may be successfully cultivate. By old grass-land we mean land that has remained in that state for twenty, thirty, fifty, or a greater number of years without being turned up by the plough. Grass of these ages rarely falls to be broken up by many farmers, and those who are concerned in that process seldom have an opportunity of repeating any improvement made during the course of their first attempt to cultivate old grass land. Hence, though few branches of husbandry afford room for more successful cultivation than the breaking up of old grass lands ; yet it generally happens that those so engaged seldom gain much profit to themselves, or convey any benefit to the land under their management. It is presumed that, to the imperfect mode of culture often practised when the plough was introduced into old grass lands, may be attributed the strong antipathy which influences the majority of proprietors (English ones especially) against renovating them by tillage. In fact, it is consistent with our personal knowledge, that many fields of such land have been considerably injured in consequence of the plough being used, entirely owing to the proper mode of destroying the aboriginal inhabitants being omitted.

Under these circumstances, the antipathy of proprietors against breaking up grass lands, need not excite surprise. A field of old grass is a treasure which deserves to be guarded, and ought not to be wantonly broken up, unless it can be shewn, that the introduction of tillage will not deteriorate its value, or lessen its ability to carry good crops of grass afterwards. The object of this Section is, therefore, to shew, that it is perfectly practicable to plough such lands without dissipating the treasure contained in them, and to restore them to grass, after carrying a round of crops, and being cleaned by bare summer fallow or drilled turnips, according to the nature of their soils respectively, or to the climate in which they are situated, and other local circumstances. Ploughing the land at proper intervals will never reduce the natural value of any land, provided the management in the interim is well executed.

LAND which has lain for a considerable time in grass, is, in every situation, brought with difficulty into a proper arable state; because the roots of the natural grasses retain such a hold of the soil, that artificial plants cannot either

thrive or prove productive, till the former are completely eradicated or destroyed. This difficulty prevails in different degrees, according to the nature of the soil cultivated; for, upon soils of a light or mellow nature, grass roots may be destroyed with greater facility, and corn crops gained for a series of years at much less expense than is practicable upon soils that are composed of clay, or incumbent upon a retentive bottom. But, though corn crops may, in the first instance, be easier cultivated upon some soils than upon others; yet no soil whatever can be successfully restored to grass in a suitable manner, without being previously completely summer fallowed, or sufficiently cleaned by a fallow crop, according to its nature, and other circumstances. It is from neglecting these radical operations, that the conversion of grass land to tillage so often proves injurious both to proprietors and occupiers. The general richness of such lands holds out a strong temptation to persist in ploughing till the soil is completely possessed by root weeds. In this state it is not one year of summer fallow which will clean them effectually; of course, when that radical operation is administered, it too often proves defective. What is worse, in many cases

the disposition of the soil to produce the natural grasses sometimes influences the possessors to continue the ancient practice of allowing it to seed itself; and, in others, to dubb it with a thick covering of what is called hay seeds, which are seldom calculated to stock the ground with plants for returning a suitable produce. The good husbandman will not, however, follow any of these plans. He will fallow or clean the ground broke up from old grass as early as possible, and the proper time is generally in the second year immediately after a crop of corn has been taken. By taking one corn crop, which serves to rot the surface grasses, and fallowing in the second year, when these grasses are in a weak and debilitated state, he can with ease put the ground into a husbandman-like condition; and, by fallowing a second time after four or six crops of grain have been taken, the ground will be brought into the most appropriate condition for being seeded with grasses, and of producing double the quantity of food for cattle or sheep as could be procured from it previous to its renovation by tillage.

IN order that our sentiments on these important matters may be perfectly comprehended, we are under the necessity of entering at some length upon the several processes requisite, from breaking up the ground in the first instance, till it is again restored to grass, and also of speaking upon these processes as applicable to different soils ; for what is good management upon one variety of soil, may deserve a different character when applied to another. It is in such matters that theorists chiefly act erroneously ; for, like the physician in the play, these gentlemen too often bleed the west ward, and jalap the east ward, indiscriminately, without investigating the situation of the patient, or ascertaining whether these remedies ought to be administered,

WE shall first treat of clay soils, because this variety extensively prevails in Britain ; and with them may be included all these soils incumbent upon a retentive bottom, and which of course may be considered as too wet for allowing turnip husbandry to be exercised with advantage.

EVERY variety of clay is difficult to cultivate, though in favourable seasons, under the manage-

ment of an expert cultivator, some of them are more productive than the richest free soil. The grain produced upon clay land is generally of good quality, and wheat may be there raised to a greater extent than is practicable upon light lands. The management, however, of clays is always expensive, and, in particular years, crops are exposed to much hazard and danger. Hence, less rent can be paid from them in proportion to the gross value of produce, than from soils of a less expensive and hazardous nature.

No kind of soil requires to be oftener renovated by the plough than clay, especially if it be of a thin nature. The best grass is always obtained in the first year after being sown down, while the roots are creeping upon the surface, and not obstructed by the poverty or sterility of the sub-soil. Rich clays will progressively improve while kept in grass, though in an inferior degree to those soils of a drier and less obstinate nature. Hence, the great propriety of exercising alternate husbandry upon clay soils; in other words, of breaking them frequently up with the plough, and restor-

ing them again to grass, after being cropped for five or six years.

WHEN grass land of a clay soil is converted to tillage, the first crop, in every case, ought to be oats; there being no other grain that forages so well, consequently none that makes a greater return of produce at the outset, when the surface is obstinate, and the natural grasses unsubdued. To procure a full crop, both good ploughing and plentiful harrowing are necessary. The plough should go deep, lay the furrow well over, and at the same time leave it with a strong shoulder, so that the harrow may have a face to work upon. In harrowing, the horses ought to be driven lengthwise, till the surface is in some measure broken, when cross harrowing may be resorted to. We have frequently seen old grass land that required eight or nine double times of the harrows before it could be considered as in any thing like a finished state; but this seldom happens, unless in seasons when little frost is obtained, or where the surface is strongly bound with grass roots and other rubbish.

THE most advantageous practice is to summer fallow all such lands in the second year, and this practice is decisively recommended as being most conducive to the interest of the tenant, and the future management of the ground. Repeated trials confirm the sentiments formed on this point; and we are fully satisfied, that heavy land cannot be brought into a right cultivable state, or corn crops successfully raised, unless this radical measure is resorted to. Besides, the grub-worm is often a dangerous foe to corn crops on clay soils newly broken up from grass, especially in the second and third year, and indeed during every subsequent year till the land is fallowed; and we know no other method of extirpating this mischievous insect, but by repeatedly ploughing the ground in the summer months, or paring and burning the surface. Another circumstance which renders an early fallow highly necessary, is the quantity of thistles and other rubbish usually infesting grass land, which, if allowed to remain undestroyed, will effectually prevent artificial crops from thriving. It must also be added, that the fallow should be executed in the most perfect style; perhaps seven or eight furrows may be required, with rolling, harrowing, and

hand-picking, till the soil is sufficiently cleaned and pulverized. A dressing with lime will also be highly advantageous, as all old grass land, when first ploughed, is eminently benefited by calcareous matter. Dung will rarely be required in the first instance, the quantity of animal and vegetable substances accumulated in former years being sufficient for carrying on the growth of plants for a considerable time.

IF the several operations of fallowing are completed in due time, and the season be favourable, wheat may be sown ; but if circumstances prevent seed work from being executed before the middle of October, it will be better to delay that process till the spring months, as all land fresh broken up from grass, after being completely wrought, is apt to throw out the young plants, unless they are well rooted before the winter frosts set in. From repeated trials, February is recommended as a good month for sowing such lands, when a proper autumnal season has been lost ; and, if it were not for the chance of missing good weather in the above month, we should say, that the sowing of wheat upon fallows, under the

circumstances described, ought always to be delayed till the arrival of the spring quarter.

AFTER wheat, beans drilled and horse hoed are the most eligible crop, as the work necessary will restore the land to the same good condition in which it was after being summer fallowed. Barley, with grass seeds, may follow the beans; though, as grass seeds, particularly clovers, seldom thrive well upon land which has been lately depastured for a considerable time, we are inclined to recommend a second wheat crop, after which that summer fallow should be repeated; and if dung is applied in this stage, the ground will be in excellent order for being seeded with grass, whether it is sown with wheat or barley, both these grains being good step-mothers of grass seeds.

ACCORDING to the above plan, we are certain that there is not a piece of old grass land in the island but what may be safely broken up, provided the several operations are executed in a husbandman-like manner. Nay, what is better, we are almost confident that such land, after being renovated by the plough, will carry

more grass than it did before aration was introduced ; while under tillage, weighty crops of corn may be obtained at no greater expence than called for by the arable husbandry of the old ploughed lands. Further, as the old arable lands are worn out and exhausted by perpetual tillage, the breaking up of the old grass land would furnish an opportunity for laying down the other with grass seeds, and restoring them to primitive vigour. In this way a very large part of British soil might be doubled in value ; at least the quantity of grass and corn raised thereupon might be vastly increased, and a full supply of the necessaries of life procured for the people, without being dependent upon other nations, as Britain for many years has been, for wheat, oats, tallow, butter, cheese, flax, and hemp, articles which must be imported under the present state of British agriculture ; though it is obvious that the whole of them might be cultivated and produced at home, were due attention bestowed upon the resources of the country.

WE have now stated our sentiments respecting the best mode of managing clay soils recently broken up from old grass, and mentioned

some of the numerous advantages which the country would derive were old grass land brought under alternate husbandry. It shall now be our business to speak of other soils, particularly loams, which, being naturally most congenial to the growth of grass, may be considered as the soil of the great majority of old grass lands.

LOAM consists of several varieties, according to the quantity of manure bestowed in former times, and the nature of the subsoil on which it is incumbent. Heavy loam must be treated in every respect as if it were a clay, because it is disqualified by nature from carrying a crop of turnips with advantage; but light loams, or those placed upon a dry bottom, are very fit for turnip husbandry, and therefore may be included with gravels and sands, because a similar rotation may be practised, though, no doubt, with different degrees of success.

WHEN any of these varieties are broken up from old grass, the succeeding rotation ought to be oats, barley, turnips, spring wheat, or barley, according to the time that the turnips are consumed. With either of these last mentioned

grains, grasses ought to be sown, which may remain for one year, when wheat may be taken, and the rotation commence again with a turnip crop. It is proper, however, to explain why barley is recommended as the second crop of the first rotation, because such a recommendation is contrary to the alternate rules of husbandry, which, in general cases, we wish should be steadily adhered to. Every person acquainted with the breaking up of old grass land must be aware that the surface grass, and roots of different kinds, which all land long under grass is apt to produce, will not be destroyed by the culture given to the first crop, and, of course, be sensible of the trouble and difficulty which attends the working of such land in the second year. In most instances, when reduced by harrowing, the land may be said to be covered with such a quantity of grass roots as to render it totally unfit for carrying a crop of turnips; but, if barley is taken as a second crop, the greatest part of these roots will be destroyed by the weight of the crop, while the soil will be greatly enriched by their destruction. It is obvious that couch grass or quickens are not included in this description, for such are not to be destroyed in this way, but

must be gathered by the hand, otherwise the ground would suffer considerably. It is the roots of ordinary pasture grasses which are alluded to, and these undoubtedly may be brought to a state of putrefaction in the way above described.

IT may not be improper to state, that barley on old grass land, unless lime is applied, is usually inferior in quality to what is produced upon old cultivated land, yielding of course a smaller produce than the appearance or bulk of the crop upon the ground would seem to indicate. In fact, barley of good quality is not to be obtained without an application of calcareous matter.

THE third crop which ought to be taken is turnips drilled, and completely hand and horse hoed. This root may now be raised with success, as any of the surface grasses which may still remain in life, will be weak and feeble, and easily destroyed by the work given to the turnip crop. The intervals of the drills ought not to be less than 30 inches, which will admit horse labour with effect, and probably secure a weightier crop than could be gained from narrower intervals. The seed ought to be sown tolerably thick, perhaps not

less than 3 lb. per acre, and the plants set out at 8, 10, or 12 inches from each other, according to the earliness of the season, state of the weather, fertility of the soil, and other circumstances.

If the turnips are consumed at a proper time, say by the first of March, spring wheat may be taken as the fourth crop, provided the weather permits the land to be duly harrowed; but failing wheat, barley may be substituted in its place. If the ground is ridged up as the turnips are consumed, wheat may be sown every day, taking care to protect it from rooks and pigeons, who, at that season, often occasion considerable damage. Wheat may be sown with safety upon well prepared land till the end of March; but so late a time cannot be recommended as a general practice. Grass seeds to be sown with this crop, and the land to be afterwards pastured for one or more years, as circumstances may render necessary. When broken up a second time, oats, beans, and wheat, may follow in succession, and the rotation be concluded.

HAVING now shown the most appropriate methods of introducing alternate husbandry into

those districts where old grass land is prevalent, it remains to give a general statement concerning the advantages which might reasonably be expected from its introduction.

THE first, and certainly a very important advantage, resulting from ploughing old grass land, is, that a full supply of the necessaries of life would be obtained by the public, in consequence of that measure. It is computed, by those versant in such inquiries, that good pasture land does not furnish above 12 stones (16 lb. avoirdupois each) of beef or mutton, per acre *per annum*, above the weight of the animal or animals when laid upon the grass; which, upon the supposition that a healthy person requires one and a half pound per day to support him, would be consumed exactly in one hundred and twenty-eight days. If this land, however, is converted into tillage, more than triple the number may be fed upon its produce, as will appear from the following calculations. Suppose the crop to be only six quarters per acre, which is a low estimate, upon the lands under consideration, and that four bushels are required for seed, and six bushels to the horses employed, there remains a disposable

quantity of four quarters six bushels, which, at the average weight of four hundred pounds per quarter, gives nineteen hundred pounds weight of bread corn for the use of the people. If we shall estimate that one-fourth of that weight goes for pollard, seeds, or waste in the manufacturing, which is a great allowance, the remainder amounts to fourteen hundred and twenty-five pounds weight of meal or flour to be used for bread and other purposes, which, at three pounds weight per head per day, will supply the consumption of 475 people for one day, instead of 128, who procured food for the same time, from the beef or mutton produced upon an acre of grass land. The comparison would still be more striking, were it extended to potatoes and other esculents, which, of course, would form a part of every rotation, were convertible husbandry introduced.

BUT it may be alleged, that a general introduction of the alternate husbandry would occasion a scarcity of butcher meat, and that an exchange of difficulties would be the consequence of adopting the system recommended. To this it may be answered, that, if alternate husbandry

was practised, the quantity of butcher meat would be increased, to the great advantage both of the public and individuals. After what has already been repeatedly urged in other parts of this work, it need hardly be stated, that a considerable quantity of land in England is oppressed by the plough, and that a great improvement would be accomplished were it sown down with grass seeds, and invigorated by pasture, after being completely summer fallowed. If the like quantity of this old tillage land was annually sown with grass seeds, as was broken up from old pasture, perhaps one-fourth more cattle and sheep might be fed for the butcher than practicable under the present system. None but those who have tried it can be sensible of the vast improvement made by grazing old ploughed land. If one million of acres of old tillage land were sown down in a gradual manner, and the like extent of old pasture broken up, it is probable that an additional annual supply, not less than two millions of stones of beef and mutton, and three millions of quarters of grain, would thereby be thrown into the public market. In short, were alternate husbandry generally exercised in Britain, we are satisfied that double the extent of its

present population might with ease be maintained; and this might be proved in the most satisfactory manner, by an appeal to the quantity of grain and butcher meat produced upon these farms where that system has been adopted and followed.

ANOTHER advantage of great magnitude would necessarily be obtained, were the old pasture lands converted to tillage, viz. an immense quantity of manures would thereby be furnished for enriching the poorer soils, and ameliorating the old tillage fields, before they were laid down with grass seeds. Every three acres of old grass land broken up would with ease furnish dung for one acre; consequently the ploughing of one million of acres would return dung for three hundred and thirty-three thousand acres of barren or unproductive land, *per annum*, for three or four years afterwards. An additional increase of one quarter and a half of produce might reasonably be expected to follow from the manure thus afforded to the unproductive lands, while the original stock of manure, like money vested at compound interest, would accumulate and increase from year to year, till the country was improved to the

greatest degree which physical circumstances permitted.

WE have been more particular upon this branch of our subject, than at first sight may seem to be necessary; but an attentive examination of the rural economy of the sister kingdom convinced us, that the exclusive system generally followed was attended with effects pernicious and destructive to the public interest. At the same time, as the great body of farmers, in every district, are more defective in the management of land newly broken up from grass, than in any other branch of practice, it occurred, that too much, if it was right said, could not be urged in elucidation of the several processes that fall to be executed when convertible husbandry is introduced.

WE cannot close this branch of our subject, without urging the utility and advantage of conjoining live stock and corn together, and of making the management of the one subservient to the growth of the other. However much the general system of agriculture may have been amended of late years, there are

comparatively few arable farms where double the quantity of live stock might not be kept, without lessening the annual produce of grain. By a proper combination of green crops, such as tares and clover for summer, turnips for winter, and potatoes and ruta бага for spring, the tillage farmer may fatten a quantity of stock equal to the grazier. No doubt a considerable capital is required to set such a system on foot, besides a good deal of trouble in its execution; but these are indispensable requisites in every improved system. What we chiefly contend for is, that alternate husbandry is most beneficial to cultivators, and to the public; that a farm managed according to its rules will yield a greater quantity of produce than if any other system is adopted; that if one-half of the farm is kept under artificial grasses, and other green crops, as much live stock may be supported and fattened upon their produce, as if the whole farm was kept in old pasture; and that the other half, from the large quantity of dung produced from the consumption of green crops, will furnish as much disposable produce for supplying the market, as if the whole farm had been kept in a regular sequence

of corn crops. All these advantages may be gained by a conjunction of stock and corn husbandry; and from this conjunction British husbandry may be more substantially improved than in any other way.

CHAP. X.

ON LIVE STOCK.

THOUGH horses, neat cattle, sheep, and swine, are of equal importance to the British farmer with corn crops, yet we have few treatises concerning these animals, compared with the immense number that have been written on the management of arable land, or the crops produced upon it. Whether this difference of attention proceeds from an erroneous preference of the plough, or is owing to the ignorance of agriculturists respecting the properties of live stock, we shall not stop to determine. The fact is, however, as we have stated it; though, according to the present improved system of farming, there is such a connection between the cultivation of the ground and the breeding, rearing, and fattening

of domestic animals, that the one cannot be neglected without injury to the other.

THOUGH little has been written concerning the domestic animals of Britain, it deserves to be remarked, that the improvement of those animals has not been neglected ; on the contrary, it has been studied like a science, and carried into execution with the most sedulous attention and dexterity. We wish it could be stated, that one-half of the care had been applied to the selecting and breeding of wheat and other grains, as has been displayed in selecting and breeding the best proportioned and most kindly feeding cattle and sheep. A comparison cannot, however, be made with the slightest degree of success ; the exertions of the stock-farmers having, in every point of view, far exceeded what has been done by the renters of arable land. With cattle and sheep considerable improvement has therefore taken place. With horses, those of the racing kind excepted, there has been little improvement ; and, as to swine, an animal of great benefit to the farmer, in consuming offal which would otherwise be of no value, matters remain pretty much on their former footing.

HAVING made these general remarks, we proceed to illustrate the several sections of this chapter. These, of course, are limited to the four kinds of animals already mentioned ; and on each of these we shall treat at some length, considering the live stock of Britain to be a subject of vast importance to the national welfare, when the demand for horses is so extensive, and a full supply of butcher meat so necessary for public comfort and luxury.

SECTION I.

Of Horses.

THE ingenious and well informed Mr Culley is of opinion that there are three distinct breeds of horses in the island, viz. the heavy Blacks, the Racers, and the Shetland Ponies. We suspect, however, that there are many more, though it is

not easy to say any thing about the origin of these breeds, and whether they have been occasioned by crosses at different periods, till a new breed or variety was actually produced. The horses in the low-country districts of Scotland are evidently of many breeds ; and, from what we have seen in England, the breeds are innumerable ; and in shape, size, action, and other properties, are as incongruous and separate as the breeds of sheep in the different districts. What a difference, for instance, is there between the Suffolk Punches and the Cleveland Bays ? If the latter are compared with the Northamptonshire horses, it can hardly be said that there is the slightest affinity, as to size, shape, and action ; and the most that can be advanced is, that both belong to the tribe of animals called horses. Again, view the Welsh horses, a hardy breed, no doubt, though of a size capable of being contained in the inside of a Northamptonshire animal. In short, so many breeds prevail in the island, and these are so frittered down and intermixed, that it is hardly practicable to distinguish the source from which each proceeded. That there are good horses in all breeds is indisputable ; and the object of the farmer is therefore to select such as are best qua-

lified for the uses to which they are to be appropriated. For the plough, both strength and agility are required; a dash of blood, therefore, is not disadvantageous.

It is not size that confers strength, the largest horses being often soonest worn out. A clever step, an easy movement, and a good temper, are qualities of the greatest importance to a working horse; and the possession of them is of more avail than big bones, long legs, and a lumpy carcase. To *feed well* is also a property of great value; and this property, as all judges know, depends much upon the shape of the barrel, deepness of chest, strength of back, and size of the hips or hooks with which the animal is furnished. If straight in the back, and not over short, high in the ribs, and with hooks close and round, the animal is generally hardy, capable of undergoing a great deal of fatigue, without lessening his appetite, or impairing his working powers; whereas horses that are sharp pointed, flat ribbed, hollow backed, and wide set in the hooks, are usually bad feeders, and soon done up when put to hard work. The moment that a horse loses appetite, he must suffer by hard labour; it is therefore a

matter of serious consideration to breed only from the hardy and well-proportioned tribes; these being supported at the least expence, and capable of undergoing, without injury, a degree of labour which would disable those of a different constitution.

THE value of horses being now much more augmented than that of other animals, it appears that greater encouragement is thereby offered for breeding the best sorts than was formerly the case; and that regular breeding farms would be of benefit to the public, and advantageous to those concerned in them. Hitherto, it has been usual to work breeding mares through the greatest part of the year, laying them aside only for a week or two before foaling, and during the summer season, when giving suck to the young foal. In this way, the strength and vigour of the mother is not only weakened, but the size and powers of the foal stand a great chance of being diminished, by the exertions of the mother when kept at work. Under these impressions, we are led to consider the working of breeding mares as an unprofitable practice. Were they suffered to remain at ease, to roam upon coarse pastures, where

shades were erected in which they might find shelter during inclement weather, we are almost certain that their progeny would enter upon action with increased abilities. The expence of a breeding mare kept in this way would not be great, whilst the advantages would be innumerable. But, were the expence even greater than is incurred in the ordinary way, the superiority of the stock thus produced would much more than compensate it. A pound of horse-flesh is more than double the value of that of neat cattle and sheep ; and being as easily reared and produced as the others, great encouragement is thus offered for carrying on the breeding trade as a separate establishment. It is highly inconvenient for corn farmers to want the use of any part of their working stock during the summer season ; the plan, therefore, that we have recommended, seems well calculated to avoid every inconvenience of this nature, and to place the breeding trade upon a proper footing. In short, we are satisfied, that unless some such plan is adopted, breeding can never succeed in the arable districts, though it is evidently in the power of every farmer so situated to breed horses with the same

facility as he breeds cattle and sheep, were the like measures resorted to.

HORSES are generally put to work when five years of age, though it is probable they might be worked a year sooner, were the same attention paid to their keeping as is bestowed by the improved breeders of cattle and sheep. We are not advocates for giving much grain to young horses, thinking it expensive, and not so conducive to their health as to support them on green food. In the winter and spring months, a few turnips are eminently beneficial to young horses, by keeping their blood in good order, swelling their bone, and hastening their growth. A plentiful supply of grass in summer ought always to be allowed, as their condition through the winter depends greatly upon that circumstance. It deserves attention, that flesh once gained ought never to be lost, but that every animal whatever should be kept in a progressive state of improvement, and not suffered to take a retrograde course, which afterwards must be made up by extra feeding, or a loss be sustained, in direct proportion to the degree of retrogradation that has occurred.

THE diseases of horses are numerous, generally violent, soon reaching a crisis, and often mortal, unless taken at the beginning. The most fatal of these are disorders provincially called *bata*, or cholics, arising, in nine cases out of ten, from an accumulation of excrement in the intestines. The symptoms of this disorder scarcely require description; cold dew at the ear-roots and flanks, frequent pointing to the seat of complaint, and a desire to lie down and roll; sudden rising, and great agitation. To obtain a cure requires prompt and vigorous measures, and plenty of assistance to conduct them. A separate stable or outhouse, well littered with straw, is necessary, so that the horse may have room to roll himself without injury. A man should attend the head, that it be not beat against the pavement or wall; another to rub the belly at every quiet interval, which is a more effectual help than is generally imagined. Bleed in the neck veins if possible; and, whilst medical remedies are preparing, walk the horse about, but do not, on any pretence, drive him so fast as to harass him. Back rake him with a small hand, well oiled, and give the common gruel glyster of oil and salt; pour down by the mouth some gruel, mixed with a glass or two

of Geneva, and half an ounce of beat saltpetre; keep the horse on his legs if possible, and exercise him in a moderate manner. These remedies are generally successful, when applied in time, but a few hours delay is commonly fatal; the poor animal generally falling a sacrifice to this dreadful and excruciating disorder.

THE flatulent, or wind cholic, is known by a great fulness and tension of the belly, from rarefaction of the air contained in the intestines, and frequently by the strangury occasioned by the pressure of the straight gut upon the neck of the bladder. This last is denoted by the horse rolling on his back, and attempting to stale. The method of cure plainly consists in a speedy administering of diuretic and laxative medicines, both in the form of glysters, and by the mouth. Opiates for allaying the pain may also be used; but much attention is required for regulating the quantity, and hitting the critical period when they should be administered. If the opiate is too weak, the pain will be augmented; and, if too powerful, death will be hastened. Another species of cholic is the inflammatory or red one, supposed to originate in some internal injury,

brought on by overstrained exertion. The flatulent or spasmodic cholick is by far the most frequent with horses ; and it is in treating this species that common farriers do most mischief. In fact, to ascertain the specific disorder, and find out the proper remedies, requires a greater share of knowledge and judgment than usually belongs to common farriers. To learn veterinary science requires years of study, an intimate knowledge of anatomy, and a great deal of practice ; and to the want of these requisites may be attributed the general ignorance of country practitioners.

WE have mentioned the prominent diseases which cut off horses ; but it is out of our way to analyse and describe the catalogue of disorders to which that useful animal is exposed ; it may however be added, that cold or catarrh seems to be the proximate cause of most of them. This cold is either general or epidemic, producing fever, glanders, rheumatism, asthma, broken wind, pleurisy, and often disorders in the intestines. To avoid the proximate cause of these evils, regular treatment seems to be the surest course. The kind of treatment which deserves this cha-

racter is, never to heat nor fatigue horses more than is necessary; and if they are at any time overheated and fatigued, to cool them in a gradual manner, rubbing them well down, so that perspiration may not be obstructed, and administering a warm mash of boiled food, so that the intestines may be kept open, and the consequent disorders avoided. The horse is a most useful animal, and deserves to be treated with every degree of care. Laying that consideration aside, it is an object of importance to every farmer to have his working stock preserved in a sound, able, and healthy condition, as his prosperity and success depend, in some measure, upon their capability of performing rural labour with dispatch. To be often in the market is an expensive trade; and the only way to avoid it is to feed horses regularly, and to exceed, as seldom as possible, their ordinary working hours. Good stable management is also of essential service to promote the health of the animals; and this every farmer should attend to with a degree of diligence proportional to the concomitant advantages.

SECT. II.*Of Neat Cattle.*

OF this species of domestic animals we have various breeds, though the whole may be arranged into four classes : 1. The short horned ; 2. The long horned, or Lancashire ; 3. The Galloway or polled breed ; 4. The Kyloes, or Highland breed. Though the several breeds may with propriety be classed in this way, yet it must not be understood that the breeds so classed are in every respect alike in size, shape, and disposition to fatten. In each of these circumstances the last mentioned class, in particular, are widely different ; for the West Highland cattle have separate properties from those reared in the Northern districts ; while, again, there is a wide distinction between both these and the breed.

which prevails in the shires of Banff and Aberdeen. The very texture and appearance of the perfect article are dissimilar; though these things may depend as much upon the mode of feeding when young, as upon the original constitution of the animal.

On Short-horned Cattle.

THERE is reason to suppose that short-horned cattle are not a native British breed, but one imported from the continent; because they are chiefly found on the eastern coast, and in many places retain at this day the name of Dutch cattle. This breed differs from others, in the shortness of horns, and in being wider and thicker in their form or mould, consequently feeding to the most weight, and yielding the greatest quantity of tallow. With regard to constitution, they are not so hardy as the long-horned cattle, being thinner in the skin or hide, and requiring better food. They excel, however, in three valuable particulars, viz. in affording the greatest quantity of beef, butter, and milk. This breed, like all others, is better or worse in different dis-

tricts, according to the attention of the breeders. In Lincolnshire they are in general more subject to lye or black flesh than they are in the districts which lie farther to the north; and this evil was originally introduced by an importation of a bad sort of bulls from Holland, by persons who desired to improve the breed, but were not possessed of skill requisite for making a suitable selection. The country, on both sides of the river Tees, contains the short horned breed in perfection. The usual management there, is to give hay and turnip in the first winter, coarse pasture through the following summer, straw in the fold-yard and a few turnips in the second winter, good pasture in the second summer, and as many turnips as they can eat in the third winter, when they are treated, in every respect, as fattening cattle.

THE Sussex, Hereford, and Devon cattle, are varieties of the short horned breed, though probably with a little dash of the Lancashire blood. They are generally of a red colour, fine in the bone, clean in the neck, horns bent upwards, generally well made in the hind quarters, wide across the hips, rump, and sirloin, but narrow on

the chine. These breeds are often used for work, and, when six or seven years of age, are turned off for feeding.

On the Lancashire, or long-horned Cattle.

THE Lancashire, or long-horned breed, is distinguished from every other by length of horns, thickness of skin, large size of hoof, and coarseness of neck. These cattle are deeper in the fore, and lighter in the hind quarter, than other breeds; likewise narrower in shape, than the short-horned, though better weighers in proportion to their size. Cows of this kind are not good milkers; but the milk which they produce yields cream in greater abundance, and of a richer quality, than what is got from short-horned cows.

IT has been generally imagined, that long-horned cattle are the native or original breed of the island; but this is a matter which cannot be ascertained. Lancashire, and the western parts of Yorkshire, have long been considered as the mother district of this breed, though now spread

over many of the midland counties. Long-horned cattle, however, are usually viewed as dull feeders; and, when used in the dairy, give less milk than the short-horned kind. By Mr Bakewell and others, much improvement was made with long-horned cattle. That enterprising and judicious breeder searched the northern district for the best bulls, as he did Lincolnshire for rams; and, owing to his exertions, something like a new breed was created. The variety which Mr Bakewell bred differs from other long horned cattle, in having very fine, clean, small bones in their legs, and thinner hides. They are also of less size, and rounder in the carcass than the old long horned breed, which generally were ill formed, big boned, flat ribbed, and in short a very unsightly sort of cattle.

On the Polled, or Galloway Cattle.

THE Galloway cattle, though less in weight than those already treated of, sell higher in Smithfield market, per stone, than any other breed, owing to the fat being laid upon the most valuable parts; which seems to be a quality of

the greatest excellence, when the value of feeding cattle is to be ascertained. As their name denotes, they are without horns; a circumstance which puzzled the learned Dr Johnson, who was greatly at a loss whether to assign the deficiency to a natural or an artificial cause. The hides of this breed are not so thick as those of the long-horned, nor so thin as those of the short-horned breed; but their beef is well marbled or mixed with fat; and therefore, in point of quality, much superior to that of either. Hence the demand for Galloway cattle is always very considerable; and it is no uncommon thing to see one of these little bullocks sell for as much money in Smithfield as a Lincolnshire ox of double its weight. The cows of this breed are good milkers, and the milk which they yield is of a very rich quality. Several unsuccessful attempts have been made to amend this breed, by crossing with bulls from other counties; but the result has satisfactorily shown, that the real original polled breed can only be preserved in perfection by selecting bulls at home, of the best figure and properties. By these attempts, the breed has, in some respects, been injured; though there is little doubt but that the measures recent-

ly taken will soon restore it to its original purity and perfection.

THE *Suffolk duns* are said to be a variety of the Galloway breed. Cows of this kind are particularly calculated for dairy management, giving a great quantity of milk, and producing butter of the finest quality. Suffolk butter is well known to be the richest in the island ; though it is a curious circumstance, that the cheese of that district is the poorest of any made in the whole kingdom of Great Britain.

On the Kyles, or Highland Breed.

THE variety of this breed which prevails in Argyleshire, and several of the Western islands, has all the properties possessed by the Galloway cattle, so far as respects the quality of beef ; though, having horns, a rougher pile or coat of hair, and being differently proportioned, they are evidently a distinct breed. The Argyleshire cattle of the right sort always sell nearly as high as the Galloways, and are much in demand with those who fatten well, or wish to present the

best stock in the public market. For private use none are better calculated, the coarse parts being inconsiderable, and the principal pieces, when duly fattened, of the finest quality, and delicious to the appetite ; while, from smallness of bone, the quantity of offal or waste is altogether trifling.

THE northern breeds of cattle are neither so valuable with regard to an equal weight of the perfect article ; nor are they so clever feeders, even when put on the same pastures. Perhaps this arises from their being stunted in growth at the outset, and limited as to winter feeding during the time they are kept at home, till of sufficient age for being sold to the grazier, who is to fatten them. The prevalent colour of Kyloes is black ; and it may be remarked, that those of every other colour, black-brown, or what is called *berried* excepted, are generally bad feeders, tender and delicate in constitution ; and never purchased by good judges of cattle when they can be avoided. Innumerable are the cattle of the Kyloe sort every year brought southward ; and when properly wintered, and afterwards put upon good pasture through the summer months,

it is wonderful to what a size they will grow, and to what a degree of fatness they may be carried. They are always sure, when fat, to sell in the public market in preference to the large breeds; and this of itself is a sure proof of their superior value.

THE Aberdeen and Banffshire cattle are the next variety of the Kyloe, or Highland breed, which is to be treated of. In these counties the size of cattle is larger, probably occasioned by the superior keep given when they are young; which no doubt swells the bones of the animals, and increases their size. A good many turnips are raised in these districts, and by the use of that root the cattle are certainly highly benefited. This sort is undoubtedly the best for wintering in the straw-yards of the low countries, because few of the others have been accustomed to this mode of treatment, being generally suffered to roam at large upon the hills for the greatest part of the season, and only brought home during severe storms, when food cannot be procured in the open field. The Aberdeen and Banffshire cattle, however, are seldom treated in that way; hence, if well chosen, they are

well calculated either for feeding upon the pastures, or for receiving cutting grass in the fold-yard, according to circumstances.

Several other kinds of Scots cattle might be mentioned, particularly the Fifeshire breed, which would seem to be a kind of cross betwixt the Kyloes and the south country breeds. The Fife cattle have upright white horns, are thin-thighed, light-lyered, and excellent feeders. It appears from Dr Thomson's excellent *Survey of Fife*, that they are highly esteemed in Smithfield market, where they bid fair to rival the Galloway cattle; a circumstance which affords a good proof of their intrinsic quality being high in the scale of public opinion. Other kinds might be mentioned, particularly the Alderney or French cattle; but so few of these are kept in Britain, that it is not worth while to enter upon a description of them. Suffice it to say, that any of this breed which have come under our notice, are of so tender and delicate a constitution, that we venture to predict the breed will never become prevalent in Great Britain.

SECT. III.

On Sheep.

OF all domestic animals, sheep are of the greatest consequence, both to the nation and to the farmer; because they can be reared in situations, and upon soils, where other animals would not live; and, in general, afford greater profit than is to be obtained either from the rearing or feeding of cattle. The very fleece shorn annually from their backs is of itself a matter worthy of consideration, affording a partial return not to be got from any other kind of stock. Wool has long been the staple commodity of this island, giving bread to thousands employed in manufacturing it into innumerable articles for home consumption, and foreign exportation. In every point of view, sheep husbandry deserves to be esteemed as a chief branch of rural economy,

and claims the utmost attention of agriculturists. For many years back it has been studied with a degree of diligence and assiduity not inferior to its merits; and the result has been, that this branch of rural management has reached a degree of perfection honourable to those who exercise it, and highly advantageous to the public.

THE varieties of sheep spread over the island of Great Britain are so numerous, that it is hardly within the power of the greatest connoisseur to class them regularly, or to illustrate their different properties. Every useful purpose, however, may be attained, by classing them into long and short woolled breeds, and into the breeds which have horns, and those that are without that appendage. Of the long-woolled kind we have the Tees-Water, the Old and New Leicesters, the Dartmore Nots, the Exmoor, and the Heath sheep; and of the short-woolled kind, we have the Dorsetshire, Hereford or Ryeland, the South-down, the Norfolk, the Cheviot, and the Shetland sheep. On the other hand, the Tees-Water, Old and New Leicesters, Dartmore Nots, Hereford, South-down, Cheviot, and Shetland

breeds, are without horns ; while the Exmoor, Dorsetshire, Norfolk, and Heath sheep have horns, though of different sizes. From this classification, it will appear, that horns are not necessarily connected either with one kind of wool or another, being found upon the heads both of long and short woolled sheep. The Norfolk sheep, which are slow dull feeders, have long horns, though they carry upon their backs fine short wool, of great value to the manufacturer. This breed, however, is on the decline, and seldom kept, unless where the folding system is retained, being supplanted by the Leicesters and Southdowns, both quicker feeding animals, and the latter yielding wool of a quality not much inferior to what is imported from Spain.

To treat of the several kinds now mentioned, would lead us into a field of greater extent than circumstances will permit; our illustration, therefore, shall be restricted to the Southdown, Old and New Leicester, Cheviot, and Heath breeds ; these being, in fact, the kinds chiefly reared and fed ; though even of these there are many va-

tieties, according to the mixture of blood communicated by crossing with different tups.

On the Southdown Sheep.

THIS breed have grey faces and legs, fine bones, and long small necks; are low before, and light in the fore quarter. Their flesh is fine in the grain, and of an excellent flavour. The defect of this kind arises from their standing higher behind than before, whereby the hind quarters are heaviest; which defect might certainly be remedied by the use of fine woolled tups, suitably proportioned. At this time the Southdown sheep are getting into fashion, being a quick-feeding breed; the wethers are capable of being disposed of at an early age, being seldom kept longer than two years, and often sold fat when only eighteen months old. From trials made in Norfolk, they are reported to stand the fatigues of folding equally well with the old breed of that county, which, as already said, is going out of repute.

On the Old Leicester, or Lincolnshire Sheep.

THE Lincolnshire sheep, for distinction's sake called the Old Leicesters, because the Dishley, or improved breed selected from them, are generally denominated New Leicesters, have white faces, long, thin, and weak carcasses, and no horns; they have thick, rough, white legs, large bones, thick pelts, and long wool, measuring from ten to eighteen inches, and weighing from eight to fourteen pounds per fleece. This kind are naturally dull feeders; and, even when fat, the carcass is coarse grained, and of inferior value. The great quantity of wool clipped from this breed has, however, kept it longer in reputation than otherwise might have been expected; though it is only in such a county as Lincoln, where innumerable grass fields of the richest quality are every where to be found, that sheep of this kind can be fattened. After this character, it will appear surprising that Mr Bakewell resorted to this very county for selecting the tups and ewes from which his improved breed were raised. Strange as this may appear, it is not the less true on that account; for the Lincolnshire

breeders, being led astray by long wool and big bones, suffered themselves to be deprived of their most valuable sheep before they were sufficiently sensible of their value. The prejudices which long prevailed against the new breed being now, however, greatly removed, the ancient stock is fast wearing out, whilst its place is supplied by quicker-feeding animals, to the great advantage of the owners, and to the benefit of the public. Lincolnshire is naturally a most valuable grazing district; therefore, in every point of view, it is a matter of serious consideration, that the natural advantages which it offers should not be misapplied.

On the New Leicester Sheep.

THIS valuable breed claims our particular attention, being easier fed, and brought sooner to perfection than any other in the island. It was originally selected by Mr Bakewell, from the best of the old Lincolnshire stocks; and, being crossed and recrossed, till something like perfection as to shape, size, and disposition for feeding cleverly, was attained, a new breed was thus

formed, capable of giving the greatest return to the grazier, and consequently of the greatest benefit to the public.

THE new Leicester, or Dishley sheep, are spread so extensively over the island, and their properties are so well known, that it is almost superfluous to say one word concerning them, or to insist on the benefit which the public would derive, were this breed brought into general use in all the lower districts, where turnips can be raised for their winter and spring consumption, and good grass for their summer pasture. We are almost certain, that no breed whatever will make a greater return to the farmer for the meat that is consumed; and this we consider to be the true criterion which ought to influence those concerned. If this breed, at two years of age, is equal in value to other breeds at three years of age, the keep being alike, there can be no doubt respecting its superior advantages. On these matters hardly any doubt can be entertained. We do not mean to say, that the mutton will be equally delicious to the palate of the epicure as that of the slower feeding breeds, this being altogether a different question; all that is meant

is, that a given quantity of grass will make a greater return to the occupier when depastured with the new Leicester sheep, than with any other of the varieties with which we are acquainted. This is the true criterion for the farmer, the taste of the consumer being with him an object of secondary consideration.

On the Cheviot Sheep.

THIS is a valuable breed, carrying on their backs wool of a quality, which always bears a high price in the market, and therefore forms an object of great importance to the breeder. Perhaps a small mixture of the Dishley blood with the original Cheviot sheep is of material advantage to that breed, not in respect of wool, which certainly is not ameliorated, but merely because the size, shape, and disposition of the animal, would thus be greatly improved. The Cheviot sheep have a great affinity with the Southdown breed; and we are much inclined to think that both originally descended from the same parents. By covering them with a Dishley tup, the deficiency in the fore quarters of each would

be amended, though we do not say that the quality of the wool would be improved. The farmer, in managing this breed, must therefore be guided by the relative advantages of wool and carcase. If the first preponderates, then no cross should be resorted to which would lessen the value of the fleece; and if the other, then the shape, size, and disposition of the carcase to fatten, will necessarily claim a priority of attention. As in the present state of British markets, meat is an object of greater consideration than wool, every farmer's attention ought therefore to be directed more to the improvement of carcase than to the fleece with which it is covered.

A CONCISE view of the properties that are considered as most essential to the Cheviot breed of sheep may be added.

HEAD, polled, bare, and clean, with jaw-bones of a good length; ears, not too short; countenance, of not too dark a colour; neck, full, round, and not too long, well covered with wool, and without any beard or coarse wool beneath; shoulders, deep, full, and wide set above; chest, full and open; chine, not too long, straight,

broad, and wide across the fillets; hams, round and plump; rump, short and bushy; body, in general, round and full, and not too deep or flat in the ribs and flanks; legs, clean, of a proportionable length, and well clad with wool to the knee-joints and houghs; fleece, fine, soft, close, and thick set, of a medium length of pile, without hairs at the bottom, nor curled on the shoulders, and with as little coarse as possible on the hips, tail, and belly. A sheep possessing these properties, in an eminent degree, may be considered as the most perfect model of the Cheviot breed.

On the Heath, or Mountain Sheep.

THIS is a hardy breed, having spiral horns, black faces, black legs, wild-looking eyes, and short firm carcasses. The sheep of this breed are covered with coarse, shaggy wool, exceedingly active, and well adapted to the mountainous districts in which they are reared. They are seldom fed till three years of age, generally when they are four, but sometimes kept till they are five, at which time they feed well, and afford

mutton of the richest flavour. This hardy tribe is first met with in the north-west of Yorkshire, and are, in a great measure, in possession of the hills in the northern parts of Scotland. Perhaps there may be different varieties of this breed, particularly in Galloway and Ayrshire, owing to crosses with the Cheviot sheep; but none are better calculated to thrive in the mountain districts than the original heath sheep; because none are so constitutionally disposed to encounter the hardships which must be undergone in such situations. Their wool is certainly of small value, but might be improved by crosses with other breeds; though there is a considerable danger that what was gained on the fleece might be lost upon the carcase.

HAVING detailed the properties of the chief breeds of sheep kept in the island, it remains to notice the management exercised with these animals, whether considered as breeders or feeders. The object is, in every case, to prepare them for

the butcher ; though this object is obtained in various ways, and at very different periods.

IN the upland, or breeding districts, sheep are disposed of at various ages, and for various purposes. A draught of ewes is annually made for the lowland feeders, who, after taking a lamb and selling it to the butcher, feed the dam, and dispose of her in like manner afterwards. A draught of wether sheep is also annually made to the lowland farmers, and these are fed either upon grass or turnips, according to the season in which they are purchased. It is generally believed, that ewes and lambs are the most profitable stock in the lowland districts, because the profits of feeder and breeder are thus combined. This branch of stock is usually purchased at the end of autumn, wintered on the stubbles and aftermath, and receives a few turnips in the spring previously to the period of lambing. Afterwards, the ewe and lamb are fed upon early grass ; and often in this way both are ready for the butcher at the same time ; though, in general cases, a month or two more is required to prepare the dam for market after the lamb is removed. In this case the fleece is obtained, which,

if the breed is of a suitable kind, is an important matter to the farmer. Lambs in this way are prepared for the market from Candlemas to Lammas; though it may be remarked, that those sold about the term of Whitsunday generally yield more profit than what is gained at an earlier period. The price per pound weight is then certainly reduced; but taking it according to carcase weight, and the expence of feeding, the profit will be found of equal advantage to the feeder as if the animal had been marketed earlier in the season.

WETHER sheep are partly fed upon grass, but more generally upon turnips. The new Leicesters are often fed in this way when only eighteen months old, seldom when they exceed thirty months; but the upland breed of sheep are generally four years of age before they are considered fit for turnip feeding. Much depends, however, upon the manner in which each of the several varieties have been guided in the early stages of growth, as their progress to maturity may be hastened or retarded by the quality of the food then bestowed upon them. With sheep

the feeding in early years has more effect than with any other kind of animals.

BEFORE quitting this subject, it may be proper to add, that sheep are the only kind of live stock which ought to be kept in mountainous districts, especially in those where summer herbage is at all times scarce, and where green crops for winter food cannot be cultivated. It is completely ascertained, that by stocking with sheep, double more rent may be paid than by stocking with cattle. In fact, cattle require better food in every period of the season than sheep, and fall off when kept in the fields during the winter months; therefore should only be reared in districts physically calculated for supplying them with food of proper qualities and quantities at all times.

SECT. IV.*On Swine.*

THIS species of live stock may be regarded as of considerable importance to farmers, consuming the offal of corn, and searching the dung-hills for every kind of substance which may therein be gathered. To swine, the refuse of the fields and the scullery is a feast, and their stomachs are a receptacle for many substances which every other animal would reject.

MANY varieties of this animal prevail in the island; but without discussing them, it may be observed, in general, that the small breeds are most beneficial to the farmer, because, such may be fed upon ordinary materials without putting

him to any extraordinary expence in preparing them for market. In fact, swine are the only variety of granivorous animals that can be fed upon the offal, or such articles as would otherwise go to waste about a farm steading. Since the erection of thrashing machines, a much greater quantity of light grain is beat from the straw than was gained when the flail was employed. To use this extra quantity to advantage becomes an important concern to the occupiers of land ; and the using of it in raising and supporting swine is by far the most profitable mode of consuming an article, which, in other respects, is comparatively of little value.

UPON a tillage farm consisting of 300 acres, whereof 200 are kept under the plough, it is reckoned, that a sum not less than L.100 Sterling may be gained annually from keeping swine, were the management arranged in a systematic manner. One main advantage of such a branch of rural economy arises from little capital being required to carry it on, while the trouble and outlay attending it scarcely deserve notice. With the addition of one acre of broad clover, and one acre of tares, for the summer and autumn months,

and the like extent of ground for turnips and yams during the winter and spring months, the whole not exceeding L.20 in value, the stock of swine that we are to recommend may be amply supported.

WERE two breeding sows kept on a farm of the size mentioned, and their produce reared by the farmer, it may be calculated, that 40 swine would be annually fed off, the value of which, in the months of January and February each year, the time when pork is most in demand, would be 50s. each, even granting that the price of pork was much lower than at present, the total amount being equal to the sum already mentioned. That such a number of swine can be supported and fed upon the offals of a 300 acre farm, and the other auxiliary articles specified, may be pronounced a certain fact. We have tried it; and from the result are enabled to speak with some decision upon the subject. Where such a system of management is pursued, we decidedly recommend the small breed of swine, because they will feed in a shorter period, and thrive upon articles that would starve the larger sized animals. When speaking of a small breed,

we do not mean those that pass by the name of Chinese or pot-bellied swine. The kind in view is swine that will feed upon common fare to 7 or 8 stones Amsterdam when 11 or 12 months old, or to 9 or 10 stone when put up in the house to receive better fare. We are sorry that this breed cannot be classified, but it is by far the best for going on a farmer's dunghill, and will thrive where finer and larger breeds would be stunted and starved.

The mode of management which we recommend is, that a boar and two good sows of a proper age should constantly be kept, and that one young sow shall be reared annually, in order to supply the others when they pass maturity. We would cast off the oldest sows, *i. e.* feed them, when they arrive at 3 years of age, which of course would cause four sows to be in hand at one time. These annually would produce more than the 40 pigs, which are to be held on; but the remainder might be sold as they are weaned, there being a regular and steady demand in the country for young pigs.

It is obvious that, at the present rate of markets, 40 swine, weighing 7 or 8 stones each, are worth more money than here stated; but even upon the supposition that markets may fall considerably, the net profit will still be as much as is described. We apprehend that people would be readier to admit the truth of this part of the statement, than that such a number can be supported at so little expence; but this point can only be satisfactorily ascertained by an appeal to experience.

We have, for a number of years, kept a stock of swine in the way now recommended. They go at large in the court or yard belonging to the farm, and receive a feeding of offal grain in the morning, and of yams or turnips in the evening; and the meat fed in this way has constantly drawn the highest price. They get also the dish washings of the house, any milk or whey that remains unconsumed, and have the dunghill to roam upon, where perhaps more food is to be gathered, especially if the horses are fed upon unbroken grain, than is commonly imagined.

It will readily be conceived, that under this mode of management, the latter end of summer and the harvest months is the critical period for carrying on a stock of swine. During these months little thrashing goes forward, and horses seldom receive any corn for aliment; hence, all that can be consistently attempted is to keep the animals in a growing state, and prepare them for fattening cleverly, when food of a more nutritious quality can be given them. Clover and tares will do this effectually, the last particularly so when in a podded state. Turnips can also be got by the end of September; and it must be recollected, that through the summer months a considerable quantity of milk and whey is in every farm house, upon which swine will be found to thrive heartily.

THAT swine can be supported upon clover during summer, is not a new doctrine. The practice has long prevailed in England, and ought to be adopted extensively in this country. We once inclosed a small part of a clover field with boards, into which swine were put, taking care to fix a ring into their nose before hand, so that they

might not injure the ground, and they thrive very well.

In short, a more beneficial stock cannot be kept upon a farm than swine, so long as the quantity kept does not exceed the offals upon the premises. The other articles recommended are merely meant to render the consumption of offals more beneficial; or to carry on the stock at periods when such offals are scarce. The charge of attendance is very small; indeed the benefit gained by the dung-hill will more than compensate the expences incurred. To make as much profit from cattle or sheep as is mentioned, requires a great advance of money; but in the article of swine hardly any is necessary, while most part of the articles consumed cannot, in any other way, be converted to beneficial purposes.

Like other writers, we might have treated of rabbits, poultry, pigeons, bees, and other minor branches of live stock; but considering none of them as of much advantage to the farmer, nay rather that almost all of them are attended with positive loss, we shall not say a word on these subjects. It is more important to remark, that

the attention lately paid to the useful animals is highly creditable to British farmers, and, in particular, that the utmost gratitude is due to Messrs Bakewell, Culley, and other agriculturists, who have brought the horses, neat cattle, and sheep, of this island to a pitch of improvement, not to be equalled, far less surpassed, by that of other countries. These gentlemen have benefited themselves, as was justly their due, by such meritorious exertions; but, in ancient Rome, they would have received rewards of a different kind—when in life, their heads would have been crowned with laurels; and, after death, statues would have been erected to their memories. In Britain, however, the possession of merit is generally the sole reward of the owner; though we state, with pleasure, that a reward of a different kind has not only been deserved, but also, in some respect, obtained, by the gentlemen, who have improved the live stock of Britain so much above that of every other country in the world.

SECT. V.*On the Use of Oxen and Horses in Rural Labour.*

BEFORE closing this chapter, it is proper to say a few words on a subject much agitated; namely, whether oxen or horses are the most profitable animals for executing rural labour; in other words, which of these varieties of live stock are best calculated for that work, and to promote the public interest. On these points, very different opinions have been entertained, though, according to our views, the real merits of the subject lie in a very narrow compass.

DURING the rude state in which husbandry long remained in this island, oxen were generally employed as beasts of labour; but progressively were laid aside, and horses used in their

room, almost in direct proportion as improvements were introduced. This is a fact which ought to go a great length in determining the question, whether oxen or horses are the most useful animals for carrying on farm labour; because mankind are generally pretty sharp-sighted in every matter wherein their interest is affected, and seldom lay aside an established practice, unless the one to be substituted is completely ascertained to be more profitable and advantageous than the one that is renounced. Independent of this fact, which is incontrovertible, practical agriculturists are fully sensible, that the operations of ploughing and carting are more expeditiously performed with horses than with oxen; and this of itself, in such a variable climate as that of Great Britain, merits serious consideration. When dispatch is to be used in finishing a field, at seed time, or carting corn in harvest, horses may be pushed at a good step, without doing them much injury; but oxen, at least those of Great Britain, are unable to undergo such a measure of fatigue. They must be worked at a regular pace; for if pushed beyond it, they will be completely disabled. On these accounts, we

have always considered horses as the most suitable animals for farm-labour, especially since farms were enlarged, and work regularly executed. In small farms, where circumstances are different, where the ploughman is employed at every sort of work, in the field to-day, and in the barn to-morrow, oxen may be employed with advantage; because such an irregular system of working affords that rest from labour, which the animals confessedly require: but in a large farm, where the ploughman has little to do but to manage his team, and where nine or ten hours labour must each day be regularly performed, the case is materially altered. Oxen will not suit such a system of management, nor is it possible to execute the same work with a pair of them as may be done by a pair of horses. Two pair are necessary at all events, so as the oxen may be sufficiently rested, and another pair will be required to make up the deficiency of labour occasioned by the slow motion of these animals.

Most of these positions will be admitted by the supporters of oxen; but, under the admission, they contend, that the great superiority of oxen over horses consists in the difference betwixt their

keep, when worked, and the difference of their values at the conclusion, when they are unfit for work. Oxen, it is said, can be worked without corn; whereas one-eighth of the corn produced, is consumed upon every farm where horses are employed. Again, it is alleged, that oxen improve under the yoke, and, at the age of six or seven years, are fitter for fattening than at an earlier period; whereas horses gradually decline in value, and at last are worth no more than can be got for their skins. We have stated the arguments fairly in support of oxen, and shall now offer our opinion with as much brevity as possible.

IN the first place, two horses may be supported through the season on the produce of seven acres, viz. three acres of grass and hay, and the corn and straw of four acres of oats; whereas six oxen will require four acres of grass, at least, through the summer months, with six acres of hay, and two acres of turnips for their winter support, amounting in all to twelve acres, leaving a balance of five acres on the side of horses. The value of these five acres may be moderately estimated at thirty pounds per annum, which

certainly gives a large sinking fund for defraying the tear and wear of the horses. Suppose a pair of horses to be worth one hundred pounds, the tear and wear of them, at $12\frac{1}{2}$ per cent. the usual allowance, is only twelve pounds ten shillings per annum, which leaves the sum of seventeen pounds ten shillings for profit. Perhaps this is a new state of the case, though it is a fair one, and will be realized in every situation, where active and regular work is executed.

IN the second place, the difference of value betwixt oxen and horses, at the end of their labour, does not invalidate what we have stated in the slightest manner; because we have shewn, that the horse farmer has a sinking fund in his hand, out of which a total loss may be amply supplied. But, setting accidents aside, (and to these the ox farmer is equally liable with the other,) a total loss will rarely be sustained by a judicious farmer; because, when he finds a horse failing, he will send him to market immediately, there being always a great demand for half-wrought horses to supply carriers, higlers, and common carters, from whom full value may be obtained. If we suppose three-fourths of the

original purchase-money to be lost in general cases ; that is, when horses are seasonably cast, we shall not be wide of the mark ; but in a comparative view, betwixt oxen and horses, this loss is amply compensated by the difference of keep, when the animals are employed, which we have in no shape exaggerated.

UPON the whole, it would seem, that oxen, in the natural course of things, ought to be fattened for the butcher as early as possible ; and that horses are the most useful and the cheapest animals for performing farm-labour. Were oxen to be universally employed, it is plain, the produce of the earth would, in a great measure, be consumed by the animals kept to work it, whilst mankind would suffer materially by adopting a system erroneously recommended by some well-designing men, as eminently conducive to their comfort and happiness.

CHAP. XI.

ON DRAINING AND IRRIGATION.

THE objects of this chapter may appear to be at variance, as, by the one, superfluous moisture is meant to be removed ; whereas, by the other, water is, artificially thrown upon the surface of the earth, and, of course, a proportion thereof received into its bowels. The utility of the operations to be treated of will, however, remove the apparent incongruity, both being useful, though in different places and situations, and insuring important advantages to the husbandman.

SECT. I.*On Draining.*

FEW improvements are attended with more salutary effects than those accomplished by the removal of superfluous moisture from arable land; because, when such moisture is suffered to remain, ploughing can only be imperfectly performed, while the benefit of manure is in a great measure lost. To carry off superfluous water is, therefore, an important object in the sight of every good farmer, meriting at all times his most assiduous attention.

WITHOUT stopping to make any inquiry concerning the nature and inclination of the various strata which compose the interior of the earth,

and serve to direct or impede the passage of water accumulated or deposited within its bowels; it will be sufficient to state the most approved modes of carrying off that water in an artificial manner, thus freeing the surface of the evils resulting from these internal stores.

WHEREVER a burst of water appears in any particular spot, the sure and certain way of getting quit of such an evil is to dig hollow drains, to such a depth below the surface as is required by the nature of the substratum, and the quantity of water expected to proceed from the burst or spring. Having ascertained the extent of water to be carried off, taken the necessary levels, and cleared a mouth, or leading passage for the water, begin the drain at the extremity next to that leader, and go on with the work till the top of the spring is touched, which probably will accomplish the intended object. But if it should not be completely accomplished, run off from the main drain with such a number of branches, as may be required to intercept the water, and, in this way, disappointment will hardly be experienced. Drains, to be substantially useful, should seldom be less than three feet in depth,

20 or 24 inches thereof to be close packed with stones or wood, according to circumstances. The former are the best materials, but in many places are not to be got in sufficient quantities; recourse therefore must often be made to the latter, though not so effectual or durable.

It is of vast importance to fill up drains as fast as they are dug out; because, if left open for any length of time, the earth is not only apt to fall in, but the sides get into a broken irregular state, which cannot afterwards be completely rectified. It also deserves attention, that a proper covering of straw or sod should be put upon the top of the materials, to keep the surface earth from mixing with them; and where wood is the material used for filling up, a double degree of attention is necessary, otherwise the proposed improvement may be effectually frustrated.

THE pit method of draining is a very effectual one, if executed with judgment. When it is sufficiently ascertained where the bed of water is deposited, which can easily be done by boring with an auger, sink a pit into the place, of such

a size as will allow a man to work within its bounds. Dig this pit of such a depth as to reach the bed of the water meant to be carried off; and when this depth is attained, which is easily discerned by the rising of the water, fill up the pit with big land-stones, and carry off the water by a stout drain to some adjoining ditch or mouth, whence it may proceed to the nearest river. We have tried this method repeatedly, and were never disappointed. Indeed, if the proper spot is pitched upon for putting down the pit, the object must be attained; because the water being there stopped or impeded by a close substratum, is immediately set at liberty, when that substratum is pierced and cut through.

A mode of draining clay soils wet by rain or surface water, practised by the late Sir Henry Fletcher, Bart. with great success, seems worthy of being stated. The upper soil was of good quality; but, being situated in a mountainous part of the country, the frequent rains kept it so full of water, that it produced only a coarse grass, worth 3s. per acre. The inferior soil of clay was of great depth. The mode of draining which has been practised upon it is the following:—On

grass lands he digs 22 inches, or 2 feet deep ; the first spadeful is of the turf, taken so deep, as where it separates from the clay, the turf is dug carefully out and preserved unbroken with its grass side up, and laid on one side of the cut ; then, with a very strong spade, 18 inches long, 6 inches wide at top, and 2 at the bottom, he digs a spadeful in the clay, which the men spread about the land, on the side of the drain opposite to where the turfs were laid, as far as possible from the drain, so that none may get in again. A scoop follows to clear out the fragments in the bottom, which are also spread in like manner. They are then ready for filling ; and, in doing this, he takes three stones of a thin flat form, two of which are placed against the sides of the drain, meeting at bottom ; and the third caps the other two. Thus, a hollow triangular space is left to convey the water, which is subject to no accidents that can fill it up, or impede the current. Stones always sink deeper in the ground ; and, in the common method, this frequently causes stoppages, by their being partly buried in the clay ; but the triangle, when it subsides, does it regularly, and keeps its form and the passage for-

the water clear. One cart load of stones in this way, will do a considerable length of drain. They are carefully laid down by the side of the cut, with a shovel or basket ; and if there are any small refuse stones left on the ground after the drain is set, they are thrown in above. The stones being thus fixed, the sods are then trimmed to the shape of the drain, and laid on them with the grass side downwards, and none of the clay used in filling up.

As in some situations it is an object of great importance to save the expence of materials commonly used in filling drains, a variety of devices have, with that view, been adopted. One of these is of the following nature : a drain is first dug to the necessary depth, narrow at bottom. Into the trench is laid a smooth tree, or cylindrical piece of wood, 12 feet long, 6 inches diameter at the one end, and 5 at the other, having a ring fastened into the thickest end. After strewing a little sand upon the upper side of the tree, the clay, or toughest part of the contents of the trench, is first thrown in upon it, and after that the remainder of the earth is fully trodden down. By means of a rope through the ring, the tree is

then drawn out to within a foot or two of the smaller or hinder end ; and the same operation is repeated till the whole drain is complete. Such a drain is said to have conducted a small run of water a considerable way under ground, for more than 20 years, without any sign of failure:

WHAT is called the sod or pipe drain consists of a trench dug to a proper depth ; after which a last spadeful is taken out in such a way as to leave a narrow channel, which can be covered by a sod or turf dug in grass land, and laid over it, the grass side downwards. Such drains are said to continue hollow, and to discharge well for a great number of years. Mosses are said to be drained in Lancashire nearly in the same manner, by leaving shoulders about a foot and a half from the bottom of the trench, and laying across these pieces of dried peat or turf, cut into lengths of 16 inches, and 8 or 9 inches in breadth.

IN Buckinghamshire, in grass lands, the sod drain is thus made : when the line of drain is marked out, a sod is cut in the form of a wedge, the grass side being the narrowest, and the sods

being from 12 to 18 inches in length. The drain is then cut to the depth required, but is contracted to a very narrow bottom. The sods are then set in with the grass side downwards, and pressed as far as they will go. As the figure of the drain does not suffer them to go to the bottom, a cavity is left which serves as a water course; and the space above is filled with the earth thrown out.

ANOTHER invention for draining land is described in the Agricultural Report of the county of Essex. It consists of a draining wheel of cast iron, that weighs about 4 cwt. It is 4 feet in diameter, the cutting edge or extremity of the circumference of the wheel is half an inch thick, and it increases in thickness towards the centre. At 15 inches deep it will cut a drain half an inch wide at the bottom, and 4 inches wide at the top. The wheel is so placed in a frame, that it may be loaded at pleasure, and made to operate to a greater or less depth, according to the resistance made by the ground. It is used in winter when the soil is soft; and the wheel tracks are either immediately filled with straw ropes, and lightly covered over with earth, or they are left to crack

wider and deeper till the ensuing summer ; after which the fissures are filled with ropes of straw or of twisted twigs, and lightly covered with the most porous earth that is at hand. Thus, upon grass or ley lands, hollow drains, which answer extremely well, are formed at a trifling expence. It is said that 12 acres may be fully gone over with this draining wheel in one day, so as to make cuts at all necessary distances.

ON sheep pastures a simple mode of removing surface water is practised in some places. Whenever the water is apt to stagnate, a deep furrow is turned up with a stout plough. After this, a man with a spade pares off the loose soil from the inverted sod, and scatters it over the field, or casts it into hollow places. The sod thus pared, and brought to the thickness of about three inches, is restored to its original situation, with the grassy side uppermost, as if no furrow had been made. A pipe or opening is thus formed beneath it two or three inches deep in the bottom of the furrow, which is sufficient to discharge a considerable quantity of surface water, which readily sinks into it. These furrows, indeed, are easily choked up by any pressure, or by the

growth of the roots of the grass ; but they are also easily restored, and no surface is lost by means of them.

WITH regard to the duration of hollow drains, or the length of time that the water will continue to flow in them, and preserve the soil in a proper state of dryness, it must necessarily depend, in a great degree, upon the nature of the materials with which they are filled, and the care that has been taken to prevent their being choked up by any accession of soft soil. Independent of this last circumstance, a drain filled with stones, like the channel which supplies a natural spring, may endure for ever. Wood, with which many drains have of late years been filled, perishes at certain periods according to its nature ; but it does by no means follow, that the drain should lose its effect in consequence of the destruction of the wood. If the earth over it form itself into an arch, the water will still continue to flow. Accordingly, drains filled with bushes and straw have been known to run well after forty years.

THOUGH some of the above methods of draining are confessedly of a superficial nature, and only calculated to serve for a short period, yet a proof is furnished from them, that agriculturists in every quarter consider drainage as a most useful and necessary measure. Perhaps an overabundance of water is no less pernicious to many plants than the total want of it. At all events, when water stagnates upon the soil, the roots of plants will be rotted and destroyed : Even a temporary stagnation renders land unproductive ; and the merits of every farmer may be completely ascertained, by the degree of attention employed to prevent such an evil.

S E C T. II.

On Irrigation, or the method of improving Land by flooding it with Water.

THIS mode of improving land was practised in England so early as the days of Queen Elizabeth,

and probably was brought from Italy, where it had long been successfully executed. It has been tried in Scotland to a considerable extent, on the estates of that excellent nobleman the Duke of Buccleugh; and though the improvement made in consequence has not been so great as what attended similar attempts in England, yet a benefit has been derived sufficiently extensive, not only to defray the expences incurred, but to afford a handsome return to the occupiers. On these matters we are furnished with much useful information by the Rev. Dr Singers, Kirkpatrick-Juxta, who, in his Report, &c. to the Highland Society of Scotland, concerning the watered meadows on, or near the rivers Esk, Ews, Teviot, Ettrick, and Yarrow, describes the several operations of watering, and the benefits which follow, in a satisfactory manner.

“ The quality of the water,” says Dr Singers, “ may be ascertained by experiment. Let a small portion of land be floated with it for a month, about the latter end of harvest; and afterwards for a week or two, about the end of spring. The effects of this easy experiment will appear on the grass; either in respect of quantity, or quality,

or both; and the warmth of the water may be sufficiently discovered by its power of resisting early frosts, a matter of importance in irrigation.

THE appearance of the water is not sufficient to determine its qualities. Thick muddy rivers, enriched in their passage through towns, and fertile soils, are not so frequently to be met with in Scotland, as the friends of irrigation would wish. When these can be obtained, the operator may depend on their efficacy. But clear alpine streams differ essentially in their qualities; and these are safest and most certainly ascertained, by observing the effect of the water, and the periods of its freezing, as recommended above. With regard to those waters which are known to flow through beds of marl, there is reason to believe that much advantage may be obtained from the use of them, in a sweet and rich verdure, valuable for pasturage. Warm rivulets, containing great quantities of spring water, and resisting early frosts, may be expected to encourage an early pasturage, and probably also tolerable crops of hay. But mossy waters, darkened by the tincture of peat bogs, are very unpromising for the purposes of irrigation; though it is proper to

give them a trial ; and, if mixed with marl waters, or conducted upon soils abounding with calcareous matters, they may be productive of benefit.

It is of importance, in many dry pastures, to water lands covered with fog (moss), or with broom, heath, or other plants of less value to the farmer, for the purpose of extirpating these plants, and encouraging palatable grasses. On store farms, which have no tendency to produce the rot, this practice may prove useful ; but when there is any degree of risk from this distemper, the farmer will be cautious ; he will suffer no summer watering ; and he will allow no water to stagnate any where.

When lime and marl are very expensive, or difficult to be obtained, and water is at command, farmers in Scotland sometimes water dry slopes, with a view to enrich them for crops of grain. This practice is ancient, and has often succeeded. But, it is admitted, that water enriches the soil for grass better than for corn. The grain is often late and husky.

A flat meadow can only be watered in ridges, and requires a man of skill to lay it out in proper form, and the work is accomplished at a considerable expence. A slope may generally be watered in catch-work, at much less expence, and with much less water. It is an error to prefer the flat grounds to the gentle slopes, for water meadows, unless there be ample command of water, and skill and money to go through the necessary operations. The most rational method of improving flat grounds, is generally by draining, and then giving them a top dressing. Yet, if they can be formed into ridges by the plough, they may be converted into meadows at much less expence than is necessary if they should require levelling with the spade. This distinction may be kept in view.

A gentle declivity, which can be watered in catch-work, is an inviting subject. It perhaps produces little in the state of nature, but it may become very productive by the application of water.

The quality of the soil is of little importance, when the water deposits a great deal of enrich-

ing sediment; for by means of that substance, any soil is rendered productive. This observation very commonly applies to the water meadows in England; but it will seldom be found applicable to Scotland. And, in this latter country, loam appears always to repay the irrigator with the heaviest and best crops; mossy soils answer very well; clay does not produce so abundantly; and gravel is generally poor and unproductive, in comparison,—at least for some years, and unless fully watered, or the water good.

It will readily occur to the reader, that streams of equal quality may differ materially in respect of the facility and safety with which they can be managed, and conducted to the grounds which are intended to be floated: that, whatever stream is fixed on for this purpose, the operator should determine, by means of a level, what lands are capable of being watered from it: that it is always convenient, and generally necessary, to inclose the meadows with proper fences: and that a man of prudence will have an eye to the quantity of water, the demands of his farm, the chance of markets for any surplus he may have

to spare, and the prospect of obtaining sufficient assistance in making his crops of hay, with ease and expedition. All these matters will have their due weight in determining the grounds where a meadow shall be formed, and in fixing on the extent of it. The very common error, of laying out a greater quantity of meadow than can be fully and properly floated, should by all means be avoided, as it leads to great expences, and brings the practice of irrigation into discredit.”

AFTER giving an account of the wears or dams, the conductors or main carriers, and the sluices and hatches, and after describing the method of forming a flat meadow, and a meadow in catch-work, Dr Singers proceeds :

“ It ought to be observed, that, in catch-work, the surface of the meadow is seldom very much broken. Rough parts may be pared off, and some trivial work done in rafter-levelling *, which

* Rafter levelling is performed by cutting out slices of the surface earth, and leaving others untouched, alternately, and then beating down with mallets, or treading down those which are left, until the surface be reduced into form.

leaves a part of the sward. If any seeds are wanted, the proper kinds may be understood, by attending to what follows respecting flat meadows.

THESE are formed into ridges; by the spade or plough, and are therefore almost totally destitute of grass when newly laid down. To sow any seeds that are not perennial, or that would not agree with the soil and water, would prove a serious loss.

IF any trial have been made of the water, and if it have been found to encourage a set of good plants, these ought to be preferred. But it is also necessary to consider the soil, and to sow the seeds of such plants as are known to prosper in soils of a similar description. Attention and experience will be found the surest guides in this important point; that, from the first, the meadow may be stocked with such plants as may answer every purpose.

THE following observations on this subject are submitted to the reader's consideration, as the result of experience; viz. that natural perennial red

clover prospers in watered meadows, consisting of haugh soil, with a due proportion of marl or lime, either in the soil or in the stream ; but the common broad red clover speedily dies out ; that the plants of *Holcus lanatus* (soft vernal, woolly, or meadow grass) prosper in any soft soil, especially if it be also watered : that *Poa trivialis* (common poa, or rough stalked meadow grass) delights in the soils last mentioned, if they are possessed of a degree of moisture between loam and bog : that *Cynosurus cristatus* (crested dog's tail grass) prospers extremely well in watered loams, although botanists have scarcely attended to this fact : that *Anthoxanthum odoratum* (scented vernal grass) will hardly fail in any watered meadow, where it has been once established, however coarse the soil ; and that it not only adds to the bulk and weight of hay, but communicates the sweetest odour to the whole crop, if made in dry weather : that the genus of grasses called *Agrostis* (Bent) furnishes two species, which are very good plants in watered meadows ; viz. *Agrostis alba* (white bent), and *Agrostis stolonifera* (creeping bent) : that in loams much broken with the spade, and then watered, *Triticum repens* (couch or quick grass) forms a valuable plant for hay :

and that, for bogs extremely soft with peat, and moist also, no plant yields more hay than the common spratt, (*Juncus articulatus*), which, in richly watered meadows, comes forward very early; and would scarcely be known, if mown before feeding, by those who never saw this plant cut in proper time.

ALL these plants are adapted to furnish a crop of hay, and also to yield a very abundant pasturage; but at present they can hardly be obtained in the seed shops, excepting perennial red clover, sold under the name of Marl grass.—A farmer must reserve a portion of corresponding good grass, or purchase it from others; leaving it to stand till the seeds are mostly ripe, and then taking care to preserve these for sowing in his new meadow grounds. I have not often met with perennial rye grass in watered meadows, and am inclined to think that it does not prosper there; but, as I know that it will stand for a season or more, it may be sown intermixed, and will thicken the grass in the mean time.

THE water should be set on in the month of October, and also as early in that month as pos-

sible. The effects of this watering are very important in strengthening the roots and stalks of the plants, and preparing them for shooting up strong and vigorous next spring ; and the blades that now rise form a rough coat against winter, protecting the vital powers of the plants from the severity of that season. It sometimes happens also that, by delaying the watering process too long, early frosts supervene, and very much impede or prevent that operation.

If the land is fine and rich, it will generally be found that three weeks may be sufficient for the first turn ; and, if sour and coarse, four weeks may be necessary. The verdure will then be fine, and the soil rich and yielding. If scum appear on the grass, the water must be instantly removed.

SHOULD the water not overflow properly, stops must be placed in the small feeders. These are either of stones or stakes, either of which are firm and durable. Sods rise and float away ; and boards are seldom firm enough, though at times they may answer well. If the water, after all, does not flow properly over, notches must be cut, in order to make passages for it.

SEPARATE divisions of meadow occupy the water in succession throughout winter ; during which they ought all to have received one turn of the water, as above recommended, if not given in latter autumn.

IN severe frosts, it is not very safe to remove the water, as it operates so far to protect the grass ; and, if exposed wet to frost, it might be greatly injured. If it be necessary to alter the water in such weather, let it be done in the morning of a dry day.

IN spring, every division of the meadow requires to be again watered ; and the fine rich verdure that appears, with the soft unctuous tread of the soil, are indications of advantage being obtained ; but the appearance of a white scum warns the floater instantly to remove the water. If the weather be cold at this season, I have seen water continued a fortnight without leaving any scum on the grass, but less time will answer when the weather is warm. In a late season or climate, it is necessary to continue the watering to the end of March ; and sometimes, in high backward situations, to the end of April. But,

in the low warm districts, and in favourable seasons, the operation is finished in February.

SHOULD the early grass be consumed in pasturage, ewes and lambs answer well to eat it off; the water having been removed so long as to let the meadow become firm and dry before any stock is introduced. Young cattle may also be fed on this early grass, giving dry hay at night; but, in general, I do not consider it good management to put in cattle at all, at this season, if the farmer can afford provender for them otherwise. The grass is very soft, and the meadow at this time easily poached. At any rate, the meadow should be cleared, and the water again floating by the first of May, in order to prepare for a crop of good hay. In a very late spring, it is better to dispense with the early pasturage, if the farmer have not a particular necessity for it; and to give every degree of encouragement, so as to increase the crop of hay, and to obtain it at an early season also, when it may be safer and easier made; and that also in time to expect an abundant latter pasture in autumn.

To prepare for this latter pasture, no water should be used if sheep must be admitted. But, if they are excluded, the water may be sent over the meadow for two or three days, more or less, as may appear safe and necessary ; and then the meadow left quite dry till the grass rise, and all be ready for introducing beasts.

To get these operations performed in summer, is a great object to the judicious farmer ; as the length of the day, and frequently the fine weather, enable him to make this hay in the best manner. It is also naturally better, in point of sap and colour, when early made. But the only methods that can promote this object effectually, are, to enrich the lands well, and to remove all stock from them early in the season. In both these particulars, natural meadows are often very much neglected ; receiving no manure, and being depastured till Whitsunday, no wonder that hay is late, scanty, and coarse. Well manured meadows, from which the stock is early removed, may sometimes be ready for the scythe in June, frequently in the beginning of July, and always in the course of that month. It is of consequence

to have them in ricks before the Lammas rains commence.

IN making the hay of water meadows, the whole must be spread out equally to dry ; then turned lightly with rakes, and in the evening put into very small cocks. Next day it is again spread out, turned a second time with rakes, and in the evening put into larger cocks. In this form, it may safely remain for some days. It is once more spread out, turned, and carted away to the driest spots, where it is put up in summer ricks, containing from 20 to 30 stones each rick, of 24 lb. averdupois per stone. The rick is secured with four ropes ; and in it the hay remains till it is taken to the winter stack. The dimensions and form of the winter stack are frequently inconvenient. A round form does not admit of cutting away portions, without loosening the bindings ; and, when the size is large, the hay is ready to heat ; but fine meadow hay, early cut, is the worse for heating, although coarser hay may not suffer much injury by that process, and, in some cases, may even be improved by it. There is also some danger in the heating of a vast mass of hay all at once, as it may rot or take

fire. The stack ought to be of a rectangular form, ten or twelve feet wide, and of any length, placed with one end towards the north, and the other towards the south. In this manner, the heat of the sun does not beat on either side more than another, and the stack does not incline to lean from that circumstance. The owner begins to cut down any portions he thinks proper on the north end of the stack; and he may do so without loosening any of the ropes except the bosom rope, which is easily fixed again. A stack of this moderate breadth does not heat, the hay retains its colour and juices, and even the seed remains sound on the grasses; and, if only ten feet wide, thirty feet long, and nine feet high when built, reckoning from the ground to the eaves, exclusive of the head, and the whole properly tramped and drawn, such a stack should contain about five hundred stones of 24 lbs. each. The stacks ought to stand parallel to each other, at least ten feet asunder, to allow laden carts to back in between them, and also to admit a free circulation of air in every direction; and the bottoms ought to be all laid with stones.

As the farmer must have it in his power easily to float his meadows, or lay them perfectly dry, at pleasure, irrigation includes draining as a part of the system. It also necessarily embraces inclosing, without which the meadow may suffer from the stock, or the stock may be injured by the meadow. When the land is floated, it should be fully done, not attempting too much at a time ; and when laid dry, it should be cleared of every drop of water. By this alternate succession,—of water to enrich, with all its contents and elementary powers, or to maintain the temperature most favourable to vegetation,—followed by free air, sun, and light,—the plants not only rise in abundance, but also prosper to a high degree. And hardly any soil, however amply or expensively manured, returns such weighty crops of hay and pasture, as watered meadows : Their ample produce going, in the mean time, to enrich the other contiguous soils ; while on the meadows, no manure whatever is bestowed, except such as the water contains. In the practice of irrigation, it has been established, that meadows require a much greater proportion of days throughout the year to be dry than to be

floated; and this proportion seems to vary according to circumstances, in the soil, water, and climate; but the periods of watering seem to run between six and nine weeks in the whole year, all the different periods of floating being included.

IT is evident, that water, as a mere element, raises the temperature during winter, so long as it is capable of resisting the frost, that arrests the course of vegetation in general. In summer, it is equally evident, that moderate watering corrects that extreme drought, which tends to wither the grass; and by supplying moisture and nutriment equal to the growth and perspiration, the vessels are prevented from shrinking before the drought. It is known, that in drying, the hay of watered meadows loses more weight than the hay of other meadows exactly similar in point of soil, but not watered. Water may therefore be useful as a mere element, for protecting and nourishing grass, to a certain degree. But when mud is diffused in it, or calcareous matters dissolved, and the grass has the power of straining these substances out of the water, their effects may readily be conceived.

WHEN searched of all its mud and other matters which it holds dissolved, in as far as the grass has that power, the fluid is called 'used water' by the workmen, and considered inferior to fresh water for irrigation. It is certain, that close by the feeders, the grass on the ridges of floated meadows exceeds that which grows by the drains; but the workmen do not always appear to consider that the soil is constantly deeper near the small feeders on the crowns of those ridges; and that during winter, the water must also have had its temperature diminished, on account of its spreading over the surface, by the time it reaches the drain,

DR SINGERS, after stating, that the extent of watered meadows on the Duke of Buccleuch's estate in the above districts, was 415 English acres, describes the benefits as follows:

"THE annual returns, at present may be safely estimated at 150 stone of hay, of 24 lbs. avoirdupois in the stone, for every English acre of meadow. Some of them rise above 200 stone, and others fall as low as 100 stone, or even less, being as yet unproductive, in consequence of un-

favourable circumstances. But the average return probably rises above 150 stone. It must be remembered, however, that the returns of these meadows do not consist wholly of hay. I am disposed to think, that the returns in pasture, exclusive of the hay, do not in general fall short of the full value of the soil in its original unimproved state.

THE annual expences incurred in keeping up the works on these meadows may be considered, at an average, about five shillings per acre.

HAVING stated these general averages of charges and of returns, which are not given as correct, but only as approximating near the truth, according to my information and remarks, I shall now observe, that the total amount of expences incurred on these meadows, by the operations at their formation, may be considered as rising above L.2000; that the annual charges of upholding may be stated at L.100 and upwards; and that the returns of hay, exclusive of pasture, may be calculated as exceeding 60,000 stone.

THE value of this hay made, and at market prices, must be above sixpence per stone, which is L.1500 a-year. But it is fair to deduct about one-fourth part for the expence of making, which reduces the returns in hay to about L.1125 a-year, estimating it at the present low prices of 1806 for meadow hay, in the markets of Dumfries-shire.

As food for sheep in deep snows, the value of this hay is nearly double the above value. A stone of it maintains a score of sheep for a night, as the shepherds generally compute; and store-masters generally pay about a shilling per score each night, for a place of retreat for the sheep, during deep snows. In this view, the hay of these meadows would support 60,000 sheep in severe weather, during twenty days. The benefit of this relief, during a serious emergency, is not to be estimated below L.3000. How often such an emergency may occur, no person can pretend to foresee."

DR SINGERS concludes with the following estimate of the benefits of the watered meadows.

“ To state this in a candid and impartial manner, we must mention whatever operates either for or against them.

1st, The expence of laying out and inclosing these meadows is the principal obstacle. But when this expence is moderate, and the meadow succeeds well, a single year's crop, almost or entirely defrays the charges. When matters are less favourable, they may still be liquidated in two or three seasons. And when the expence is very low, the first year more than pays it; as must have been the case in various instances, where these meadows were done in catch-work, and succeeded well. But if the forming and inclosing should not be fully compensated in less than four or five years, there is reason still to expect that the tenant will be reimbursed.

2d, THE attention which becomes necessary to the watered meadows, in upholding them, and conducting the watering process, is mentioned as an incumbrance. I admit the fact; but what does the farmer obtain without attention? Let him consider the pains and trouble he must undergo in manuring, fallowing, sowing, and reaping,

from arable soils; and in preserving and bringing into use, the respective crops which he raises from them. But with respect to watered meadows, if a few of them are situated contiguous to each other, a common labourer employed to uphold and water them all, effectually removes this difficulty; and in other cases, a common farm-servant will very soon learn to attend to the ordinary matters that require his notice.

3d, THE danger of occasioning the rot among sheep, has been mentioned as an objection to irrigation; but this was done only by such as were not properly informed. For no person can state such an objection who considers the facts,—that these meadows are all inclosed, with only an exception of one or two; and that no summer watering is admitted on them, or any instance to be heard of sheep being seized with the rot, except one, when summer watering for once was tried.

4th, I HAVE heard it alleged, that the hay of watered meadows is not wholesome food for horses; that it breaks their wind; and that a carrier rejects it on this account. In reply to this allegation, it may be stated, that instances

are given of respectable persons having fed horses with such hay from their watered meadows as they judged proper to give them, without any detriment being sustained. If horses eat too greedily even of corn, their wind must be broken; and perennial red clover swells in the stomach, and might have produced a similar effect, when too liberally given. But at any rate, it may be asked, why raise an objection against the hay of these meadows on account of carriers horses, for which that produce was certainly not intended? If it answer the sheep in the first instance, and the black cattle in the next, every objection of this sort is removed.

IN behalf of the system of watering, the following arguments occur, which it is hoped will be admitted to be well grounded, viz.

1st, THERE is an increase in the quantity of hay, which enables the farmer to sell part of it for money.

2d, IF the farmer prefer wintering cattle, he may support a greater number, or he may feed them in a more liberal manner. And in this

district, in summer so fertile in grass, and in winter so abounding in storms, this consideration is of material importance, as a well wintered beast yields more nett profit than any two which have been poorly fed in that inclement season.

3d, THE additional hay raised, increases the quantity of farm manure, the advantages of which are soon perceived in the superior produce of the manured crops.

4th, IF an early growth of meadow-grass enables the farmer to put in weak ewes during spring, he may find such a convenience of great value for the preservation of the lambs.

5th, THE pasturage of these meadows, after the hay is removed, is generally found to be so profitable, as to balance the original pasturage of the meadow grounds, throughout the year.

6th, To feed sheep, the hay of these meadows is of importance, in so far as it saves the expence of snow retreats; which, for these numerous stocks, are now hardly to be obtained.

7th, THE risk is a more serious matter in such a case, than the expences to be incurred; and this risk is always obviated, to a certain extent, by means of the meadow hay. Should the storemaster neither be able to find hay, nor to bespeak a retreat for his flock, what would he then give to obviate the risk of immediate loss of sheep through famine, or of heavy losses in spring, occasioned by the reduction which want causes, in the health and condition of his flock? It is far from absurd to put such a case; and every storemaster will admit the hazard. It is to be wished that these dangerous emergencies should very seldom occur; let not the prudent farmer, however, disregard them."

WE now come to another branch of irrigation, provincially called *warping*, which is one of the greatest improvements that can be exercised, adding to the value and thickness of the soil every time it is repeated. In fact, a new soil is artificially created by the operation to be

treated of, and of a quality superior to that of every natural one. It is only in certain situations, however, that warping can be used ; but where such situations occur, the operation ought never to be omitted. The expence varies according to circumstances, but can never in the slightest degree be compared with the immense benefit derived from the operation.

WARPING originated in Yorkshire, and is carried on there to a great extent, especially upon the banks of the river Ouse, between York and the mouth of the Humber. When in that district, we had an opportunity of examining and ascertaining the different branches of that valuable operation, all of which were of importance, their effect being precisely the same upon a poor soil as upon one of the greatest natural value. The river Ouse, from the circumstance of receiving into its bed most of the Yorkshire waters, is constantly stored with mud and all sorts of alluvial matter ; and being stirred and kept in motion by the tide, which flows several miles above York, the alluvial matter, by the process of warping, is conveyed over the adjoining grounds, which are flat and easily flooded. Low land is, of all others, most capable of being improved in

this manner. While it is enriched by warping, no person is injured by the operation, and the benefit thereby received is lasting and durable.

JUNE, July, and August, are considered to be the best months for warping, on account of their being generally the driest months in the year, though land may be warped in any season, provided the weather is dry, and the fresh water in the river very low. When the season is wet, and the rivers full of fresh water, the operation of warping cannot be advantageously executed, as the fresh water, mixing with the tide, makes it not half so thick and muddy, and consequently incapable of depositing the same quantity of sediment upon the land as takes place when the process is performed in a dry season; neither is the water got so readily off the land during wet weather as in dry. Warping land in spring answers no better purpose than in summer, as there can be no crop that year, for the sediment must lie to soak and dry, before the ground can be cultivated with the slightest prospect of advantage. Warped land is supposed to be well calculated for producing potatoes, immense crops of that valuable esculent being often obtained upon soils,

naturally of very inferior quality, after undergoing that process.

It will be understood, from what is stated, that warp consists of mud and salts left by the water that has been admitted; and that the technical phrase *warping* comprehends all the processes necessary to admit the tide water, and to deposit its sediment upon the field meant to be so improved. Letting in fresh water would not be called warping, but simply flooding. Fresh water, though useful at proper seasons, would by no means answer the same purpose as river water stirred up by the tide; because it never could furnish a sufficient sediment for thickening the soil; neither would the sediment be of so rich a nature as what is furnished by tide water.

A COMPLETE detail of the different operations in the process of warping, is given in the West York Survey. From that work it appears, that the land to be warped must be banked against the river. The banks are commonly made of earth taken on the spot from the land: they must slope six feet; that is, three feet on each side of their top or crown for every foot

perpendicular of rise ; their top or crown is broader or narrower, according to the impetuosity of the tide, and the weight and quantity of water ; and extends from two feet to twelve ; their height is regulated by the height to which the spring tides flow, so as to exclude or let them in at pleasure. In those banks, there are more or fewer openings, according to the size of the ground to be warped, and the choice of the occupier ; but in general they have only two sluices, one called the flood-gate, to admit, the other, called the clough, to let off the water gently ; these are enough for ten or fifteen acres : When the spring-tide begins to ebb, the flood-gate is opened to admit the tide, the clough having been previously shut by the weight of water brought up the river by the flow of the tide. As the tide ebbs down the river, the weight or pressure of water being taken from the outside of the clough next the river, the tide water that has been previously admitted by the flood-gate opens the clough again, and discharges itself slowly, but completely through it. The cloughs are so constructed as to let the water run off, between the ebb of the tide that was admitted, and the flow of the next ; and to this point particular attention is paid : the flood-gates are placed so

high as only to let in the spring-tides when opened. They are placed above the level of the common tides.

WILLOWS are occasionally planted on the front of the banks, to break the force of the tide, and defend them by raising the front with warp thus collected and accumulated ; but these willows must never be planted on the top of the banks, as by giving the winds power to shake them, much damage might be sustained.

THE land warped is originally of every quality ; but to be properly warped it must be situated within the reach of the spring tides, and on a level lower than the level of their flow. Land in general is not warped above one year in seven ; a year's warping will do for that time.

THE warp consists of the mud and salts deposited by the ebbing tide ; near Howden one tide will deposit an inch of mud, and this deposit is more or less according to the distance of the place from the Humber.

CHERRY Cob Sands were gained from the Humber by warping : They are supposed to be

four yards thick of warp at least ; some of those were ploughed for twelve, fourteen, or sixteen years, before they would grow grass-seeds ; the greater part is now in feeding land, and makes very fine pasture.

IT is proper to keep land in tillage for some considerable time after warping, for six years at least. The land laid down to grass, and continued in that state, is not warped ; for the salts in the mud would infallibly kill the grass-seeds.

WHEN the grass is found to decline, ploughing and warping are resorted to ; as the land varies in quality, so does the time during which it will produce good grass ; the land is never fallowed but in the year when it is warped.

FOR a view of a clough, see Mr Young's Northern Tour, Vol. I. Plate III. p. 212. The flood-gates and sluices for letting in the water are like the common sluices and gates in canals for raising the water to assist the passage of boats ; sometimes also the flood-gates or sluices are placed above the clough perpendicularly.

CHAP. XII.

ON INCLOSURES, AND WOODS, OR PLANTATIONS OF TIMBER TREES.

THESE subjects, though not strictly of one nature, are so connected together, that they may with propriety be treated of in one Chapter. As the majority of inclosures in Britain are made by planting thorn hedges; and as all woods and plantations should be completely fenced, so that they may thrive and prove productive, the subjects to be treated of are therefore not so incompatible as at first sight may appear.

SECT. I.*On Inclosures.*

INCLOSURES, with some trifling exceptions, are formed in Britain by building stone walls,

or planting thorn hedges. These walls are either of dry stone, or of stone and lime; and when lime is used, it is either applied as bedding to the outward part of the wall, or to the whole of it, as circumstances may render necessary. Stone walls are either coped with sod, or have a cope which tapers to the top, closely built with stone and lime, or the coping is executed in what is called the Galloway fashion, with large irregular stones, according to the taste and dispositions of the persons by whom they are erected. A wall built with stone and lime is undoubtedly the preferable fence; but the expense far exceeds the value of the interest which a tenant generally has in the premises. Such walls ought therefore, in every case, to be erected by the proprietor, who thus increases the value of his property in a direct proportion with the increased value given to the land, by the erection of such fences. Generally speaking, proprietors have not been very forward in making such improvements, but have thrown them upon the shoulders of the tenantry as often as the latter would undertake the burden. Hence the bad state of fences in many districts. The tenant having only a limited interest in their success, executes the

erection at the least possible expence, and without any regard to their permanence.

To render a stone wall useful as a fence, its height ought never to be less than seven quarters or five feet three inches, otherwise it will not keep in many of the breeds of sheep which prevail in the country. In erecting the fence, great care ought to be taken to build upon a solid foundation, otherwise the wall is apt to incline to a side, and gradually to fall down. The coping should be made close; for if water gets down the inside of the wall, it will bulge out, and speedily go to ruin. To bed the stones sufficiently, and to give each a hold of the other, are likewise matters of importance; the duration of a wall depending entirely upon the attention given to the particulars we have mentioned.

THE expence of inclosing with stone walls is considerable. Where the walls are seven quarters, or five feet three inches in height, and built with lime (the plan now generally adopted) the expence of inclosures of moderate size cannot be estimated at less than ten pounds Sterling per acre, even in cases where the bounds are not

crooked or irregular. This shews that much judgement is required when inclosures are made, as otherwise a great deal of money may be unnecessarily expended.

On Thorn Hedges.

A thorn hedge makes an excellent fence when once trained up and brought to maturity ; but the length of time which elapses before it can prove of much benefit, and the great expence incurred in training it up, renders such a fence not much cheaper than a stone wall, especially if the loss from the want of it, in the first instance, is duly estimated. The expences attendant upon raising a thorn fence, however, being gradually laid out, the farmer is not so sensible of their amount as those of a stone wall, therefore generally disposed to give it a preference. If the several expences belonging to hedges, and the extent of ground wasted in this way, were fully considered, we are not certain that the balance will be much in favour of this mode of fencing. At all events, a stone wall is useful in the first year, whereas a dozen of years, at least, must elapse before a hedge can be of much benefit.

WHEN a thorn hedge is to be planted, it is of advantage to fallow the ground a year before hand; and, if the soil is poor, to dress it with dung or rich compost, so that the young plants may not be oppressed with weeds, or stunted for want of food, when weak and unable to send forth their fibres in search of nourishment. These things being attended to, and the hedge planted, an annual cleaning ought to be given, sometimes two cleanings are necessary in a season: It is also expedient to fence the back of the hedge with paling, that beasts may be restrained from going over it; and to switch it over, when two or three years of age, in order that it may be kept close at the bottom. It may be remarked, that a gap once made, can never be effectually filled up, therefore the utmost care ought to be exerted to keep cattle of all kinds from making trespasses. As the hedge grows up, repeated cuttings are necessary, so that a wide bottom may be gained, without which no hedge can be considered as a suitable fence; and some attention is required to give a proper shape to the top, which is a matter of much importance to the welfare of the hedge. When thorns are allowed to grow to unequal heights, the strong plants

are sure to master the weak ones; and when the hedge becomes broad at the top, it retains water and snow, to the great injury of the plants. All these evils may be avoided by proper management; though, as we have already said, twelve years must elapse before the best managed hedge can be considered as a sufficient fence; and, in many cases, double that time must intervene betwixt planting and perfection. Upon many soils, the most arduous endeavours will not make a fence from thorns, though this, after all, depends much upon the attention bestowed at the outset. If a hedge is once marred in growth by carelessness and negligence, it is hardly practicable to make up for former errors by additional diligence. In fact, it is an easier business to root up an old hedge, and train up a new one, than to recover a hedge which has been mismanaged, or suffered to get into bad condition from want of attention to the cleaning and cutting processes.

AN excellent plan has been lately devised for making hedges grow on thin soils, which deserves to be recorded. On such soils, it is well known hedges rarely thrive after the roots of the

thorns reach the close impervious bottom, on which all clays are incumbent, being then so chilled with water as to languish and go to decay. The plan to prevent a failure, is to cast a deep drain where the hedge is to be planted, and to fill it with stones, by which method thorns are found to thrive equally well as upon soils of a different description.

BEFORE quitting the subject, it seems necessary to state some circumstances respecting the inclosing of land hitherto too much neglected. In the first place, it often happens that landed proprietors, wishing to have their land inclosed, and not chusing to be at the trouble and expence of doing the work themselves, transfer the burden to their tenants, though such a transference is evidently an unwise and impolitical measure. It serves to take up the tenant's attention from the cultivation of his farm, and to employ his capital stock upon works very different from those in which it ought to be employed. What is worse—a farm is seldom sufficiently inclosed in this way; for though fences may be made—that is, ditches digged and thorns planted, these fences are rarely trained up in a satisfactory manner, or

in such a way as to prove of real utility either to the tenant or proprietor. No doubt the proprietor may have recourse against the tenant at the conclusion of the lease in case he was taken bound to train the fences up, and to leave them in a sufficient condition at his departure. In this case, damages may be awarded against the tenant; but such an award must be of small consolation to a proprietor disposed to have his land completely inclosed, whilst it may prove ruinous and destructive to the tenant.

IN the second place, proprietors who are at the first cost of fences—that is, who dig out the ditches, and plant the thorns, and afterwards devolve the burden of training these fences on their tenants, do not act more wisely than the class already mentioned. As the tenant's interest in the success of such fences, during a nineteen or twenty-one years lease, is but trifling, we are not to expect the same attention from him to the processes of cleaning, switching, and protecting them from gaps, as if he were more materially interested. This is human nature; and mankind must be taken as they are. In fact, it is the height of folly for a tenant to undertake such a

service as training up hedges ; nor should any one be subjected to the leaving fences in a sufficient condition, unless they are delivered over to him in that condition in the first instance. It is plain, that this cannot happen at the beginning of a lease with a farm not formerly inclosed, unless stone walls are built ; therefore a tenant ought not, under any circumstance, to have interference with fences, until that stage arrives when they can be of utility to him. The tenant's interference at an earlier period is not advantageous to either party.

IN the third place, as some doctrines have been lately broached respecting what is called a *common law*, which subjects tenants to support fences, whether they have come under that obligation or not, it becomes every tenant, who gets a new lease, to take care that the clause which relates to fences be so precisely worded as to leave no room for future altercation or contest. With regard to the common law alluded to, we never could ascertain whence it proceeded, nor the time it was first recognised. It could not be known in Scotland before the Restoration, as it is believed, on good authority, that an inclosed field of farm land was not at that

time to be found in this northern part of the Island. The act of King Charles II. regulated the inclosing of land so far as proprietors were concerned. This act, however, does not bear upon tenants in the most distant manner, therefore that class of men, according to the strict rules of justice and equity, cannot be liable to any burden, more than those covenanted with their landlords respectively.



SECT. II.

On Woods or Plantations of Timber Trees.

THE necessity of having a sufficient stock of timber for making husbandry implements; for erecting houses wherein the people may be sheltered from the inclemency of the weather;

and for building ships, our great national bulwark, is so well known, that it is totally unnecessary to say one word on that subject. It is, however, matter of regret at a time when we are likely to be deprived of all foreign supplies; that the quantity of British timber is daily decreasing, while so little attention is bestowed in planting trees for future consumption, and securing to the nation a suitable supply of timber, for the purposes already mentioned. This neglect chiefly arises from the circumstance, that those who plant timber trees rarely cut them, and can only be remedied by a legislative enactment, viz. that every landed proprietor shall have a certain portion of his property in woodland, leaving each of them to plant trees most suitable for the soil, climate, and situation of their respective properties.

It would be well if the present state of political affairs induced the legislature to take up the subject immediately, and to provide a remedy for the evils pointed out, otherwise the state of the country may be truly lamentable at a future period, should foreign supplies be wholly

withheld. It is sufficiently evident, that timber is daily decreasing in quantity at home, its price having recently advanced much beyond any alteration in the value of money, which is the sure criterion for ascertaining any thing of this kind. Within the last thirty years, timber has quintupled its price; whereas the value of corn, the staff of life, has hardly been doubled within that period. This sufficiently proves that the quantity of the one article in hand is much more curtailed than that of the other; because had an equal proportion been preserved, the advance upon the money value of the one would have been exactly the same as that of the other.

THE subject is rather of a melancholy nature, seeing that a deficiency of timber cannot so speedily be supplied as a deficiency of corn or butcher meat; though it is plain, without demonstration, that the longer the cure is delayed, the longer will the nation be deprived of a sufficient supply of timber. We are seldom disposed to be advocates for compulsory measures, judging, in ordinary cases, that every man ought to be left to manage private property as he pleases; but *Salus populi suprema lex* being a standard max-

im, compels us to declare decidedly in favour of legislative interference in this instance, being firmly convinced that the ordinary principles which govern mankind cannot operate in the present case, the profits from planting being distant and adventitious.

HAVING insisted so far upon the propriety of legislative interference, with respect to the planting of timber trees, we shall say a few words concerning the methods of planting, and the probable success which may thence be expected.

WHEN a plantation of timber is to be formed, the first step necessary is to fence the ground that is to be planted, so as cattle of all kinds may be kept from making inroads. The ground to be planted ought to be completely fallowed on the preceding year; and, if in a rough or waste state, two years fallowing will be useful. If wet or boggy, open drains ought to be dugged through all the hollow places, so that superfluous moisture may be removed. These operations being performed, the planting may proceed; in-

executing which great care should be taken to make the pits of a proper size, and, in filling them up, that the best earth be returned nearest the roots of the young trees. A mixture of timber, in the same plantation, is always advantageous, and thick planting is eligible, for the purpose of affording shelter. As the plantation gets forward, great care should be paid to thinning and pruning the trees, removing those first that are either sickly or debilitated; and in this way, and by exercising constant attention in the management, timber trees will advance with greater rapidity than when neglected and overlooked. It has been aptly said, that much expence is often incurred in planting trees, which is afterwards lost by neglecting to train them up. Trees, indeed, are, in too many cases, merely put into the earth, and then left to grow or die without further attention; whereas with them, as with all other plants, the fostering hand of man is indispensably called for in every stage of growth, otherwise they will rarely arrive at perfection, or make that return to the owner, which may reasonably be expected, when the several processes of planting, pruning, and thinning, are duly exercised.

IT may be observed, that planting trees in hedge-rows, is not only prejudicial to fences, but of great detriment to corn crops cultivated in fields surrounded by these hedge-rows, especially if the fields are of small size; a practice which improperly prevails in many English counties. If shelter is wanted for a field, the best means of procuring it is by forming belts or strips of planting, from fifty to sixty feet wide; for timber trees thus thrive much better than when planted in rows or narrow strips. All cold or murrish soils are greatly benefited by being inclosed in this way; though it may be remarked, that small inclosures ought to be avoided, as they occasion a great waste of ground, without affording benefit in other respects proportional to the heavy expence entailed upon the proprietor or tenant, for supporting such a number of unnecessary fences.

CHAP. XIII.

WEIGHTS AND MEASURES.—ROADS.

THE subjects treated of in this chapter are of a miscellaneous nature ; and, though not altogether belonging to rural art, are of material importance to those engaged in that business. The inconveniencies and losses attendant upon the discordancy of weights and measures, in the sale of agricultural produce, have been long felt and lamented in every part of Britain ; and though several attempts have been made by the legislature to procure uniformity, matters still remain upon their former confused footing. Again to have good roads, thereby facilitating the communication betwixt one district and another, is of the greatest advantage, not only to agriculturists, but likewise to persons of every description. On these accounts, the above subjects merit notice in a treatise devoted to the elucidation of rural affairs.

SECT. I.*Weights and Measures.*

THREE descriptions of weights are commonly used in Great Britain, viz. avoirdupois, Amsterdam, and Scotch tron. Avoirdupois weight is generally used in England, in the disposal of farm produce, though the number of pounds given as a stone weight vary materially. In some places, Smithfield market especially, 8 pounds is called a stone; in others 14 pounds passes by that denomination, and not unfrequently the stone weight consists of 16 avoirdupois pounds; which diversities occasion market prices to be much misunderstood, unless the kind of weight used is constantly explained. In Scotland, avoirdupois weight is only used in the sale of

imported articles, all articles of home produce being sold either by Amsterdam or Scotch tron weight. Perhaps the practice of one or two of the border counties may form an exception to what is stated; but the exception is so trifling as hardly to be worth notice. Meal and butcher meat are customarily sold by Amsterdam weight; and hay, straw, wool, and tallow, by Scotch tron, though, in the western counties, butcher meat is disposed of by the same weight. A pound weight Amsterdam consists of $17\frac{1}{2}$ ounces avoirdupois, or, which is the same thing, seventeen pounds and a half avoirdupois is considered to be the Amsterdam stone. Again the pound weight Scotch tron consists either of 22 or 24 ounces avoirdupois, as settled by the practice of the district, and of course the Scotch tron stone consists either of 22 or 24 pounds avoirdupois, according to the rate anciently established.

THE slightest reflection upon these circumstances is sufficient to ascertain the losses and inconveniencies sustained by the public from the want of an uniform standard weight. It is a matter of little importance what standard was

adopted, because were it of one size or description through the whole country, a few months usage would familiarise the dullest trader to its comparative value with the former ones. The benefits which would follow the adoption of one standard weight are so easily recognised that we need not insist upon them.

BUT if the want of *one* standard weight is so prejudicial to the public interest, what detriment must be sustained from the immense discrepancy of corn measures? Independant of different national standards, there is such a multitude of local ones, as to puzzle the brains of the most accurate inquirer. In fact, the value of corn cannot possibly be ascertained by a measure of capacity, therefore the majority of dealers now find it necessary to check measure by weight, which surely is the most satisfactory method. Upon this branch of our subject, we shall speak at some length, being satisfied that there is no branch of police of greater importance to husbandmen, than the regulation of the weights and measures by which the produce of the country is daily bought and sold.

BEFORE we describe the inconveniencies which the public sustain from the diversity of measures, it is necessary to explain how far that diversity extends—a subject imperfectly understood, but which, under the faintest delineation, must convince any unprejudiced mind of the many difficulties which surround the sellers and purchasers of corn. We cannot place this diversity in a clearer point of view than by extracting, from Lord Swinton's useful and intelligent history of weights and measures, an account of the differences betwixt the standards of the several counties, and the firiot of Linlithgow, which, by act of Parliament, James VI. 1618, is declared to be the standard corn measure of Scotland.

		Wheat measure	<i>Per cent.</i>		<i>Per cent.</i>
Aberdeen					
	exceeds the Linlithgow standard	22.353		Barley	9.677
Argyle	-	Wheat	16.025	Barley	7.258
Banff	--	Wheat	5.411	Barley	5.103
Berwick	—	Wheat	52.941	Barley	4.838
Bute	—	Wheat	30.098	Barley	34.677
Caithness	—	Wheat	—	Barley	6.025
Dumbarton	—	Wheat	16.063	Barley	6.597
Mid Lothian	—	Wheat	1.764	Barley	1.613
Elgin	—	Wheat	6.665	Barley	5.256
Fife	—	Wheat	3.529	Barley	3.255
Forfar	—	Wheat	3.529	Barley	3.629

		<i>Per cent.</i>	<i>Per cent.</i>
East Lothian	— Wheat —	2.941	Barley 3.024
Inverness	— Wheat —	14.455	Barley 9.786
Kincardine	— Wheat —	12.941	Barley 6.451
Kinross	— Wheat —	2.647	Barley 3.024
Kirkcudbright	— Wheat —	62.401	Barley 84.483
Lanark	— Wheat —	5.813	Barley 4.176
Nairn	— Wheat —	21.976	Barley 11.483
Peebles	— Wheat —	7.148	Barley 4.559
Perth	— Wheat —	2.986	Barley 4.164
Ross and Cromarty	Wheat —	12.941	Barley 3.255
Roxburgh	— Wheat —	29.412	Barley 33.064
Selkirk	— Wheat —	29.779	Barley 26.008
Stirling	— Wheat —	8.235	Barley 7.258
Sutherland	— Rye and Pease	17.647	Barley 10.644
Wigton	— Wheat	95.729	Barley 101.254

FROM the well known accuracy of Lord Swinton, there is every reason to believe that his account of the discrepancy of the measures of capacity, is as correct as circumstances would admit; but it must be remarked that many counties have no standard measures, a circumstance acknowledged by his Lordship; which, in many cases, obliged him to strike a medium of their size from the customary measures generally used. It is therefore obvious, that, in those counties where no standards are kept, every

man may make his firloft what size he pleases, thereby leaving an opening for innumerable frauds. To the immense difference between the local and national standards, must likewise be added the still greater difference between the national standards and the customary measures; the whole forming the completest system of anarchy that ever existed.

THE Parliament of Scotland, James VI. 1618, attempted to overthrow this anarchial system, but although their attempt was partly successful, it does not appear, from record, or from the practice of the country, that the salutary regulations, contained in their act of that year, were respected as they ought to have been, there not being one county in Scotland where the measures of capacity are conformable to the standards then fixed, or similar to those of the conterminous county. From this unaccountable diversity much confusion has arisen to the public, much chicanery has been used by the artful, much loss sustained by the ignorant, and many law-suits have taken their rise. Without enlarging at this time upon these general circumstances, it may be pro-

per to describe a few of the inconveniencies which the public sustain from the diversity of measures.

1st, THE grower of corn is thereby exposed to various impositions in the sale of his produce: He first measures the corn at home, and, when it is delivered, the purchaser, if he pleases, may insist upon having it measured by the standard of the place; and if the measure is the least defective, suppose only one cubic inch, the smallest quantity that will be deducted is one quarter of a peck from each bag of the cargo: If the standards were exact, no complaint could justly be made on account of this deduction; but when it is considered, that almost every one of the municipal standards are larger than they ought to be, it is more than presumable that deficiencies are often demanded, when the full quantity is actually delivered. Nor is it an easy matter to procure redress, the exact size, or cubical contents of the standard measures, being but imperfectly known among farmers; and even if they were sufficiently known by them, few municipal officers would be found willing to lend an ear to their complaints. So far from that, the municipalities of the kingdom have, in a great measure,

been the authors of the present confusion ; and are interested in keeping it up.

OWING to the municipal standards being generally larger than those fixed upon by the Legislature, farmers have been reduced to the necessity of enlarging their private firlots in a proportional manner ; thereby, in fact, conniving with the authors of their grievances. There are few places in Scotland where the measures of capacity are conformable to law, except at the port of Leith, where they are regulated under the inspection of the Dean of Guild of Edinburgh, agreeable to the assize of James VI. If measures were uniform, it is of no great importance what size they are ; but so long as the local standards are so much above the national ones, and the customary measures remain so much diversified, the farmer will continue to be robbed of his property, and incessantly exposed to vexatious proceedings, which nothing short of uniformity can effectually prevent.

THE subject may be considered in another point of view. Suppose the farmer bargains with his merchant, that his grain shall be receiv-

ed by the Linlithgow firloot, even under that stipulation difficulties may occur. The stamped firloots of Linlithgow vary very much, according to the time they were delivered, and to the abilities of the person who constructed them. Instances have occurred where the magistrates of a royal borough had one standard firloot, and the justices of the county another of a different size; and yet both parties maintained they were agreeable to the legal Linlithgow measure; which, for the time, produced utter confusion among the buyers and sellers of corn. Many years ago an action was raised by the farmers of Mid-Lothian against the magistrates of Linlithgow, before the Court of Session, for issuing illegal firloots, which, after long litigation, and an expence incurred of L.300, was determined against the magistrates.

2dly, THE diversity of measures is injurious to the consumer of bread, because the assize of that necessary article is thereby fixed higher than it ought to be, or would be, if uniformity prevailed. Many of the customary firloots are four and five per cent. larger than the standards of the county where they are used, consequently those

who possess such large measures sell their grain so much higher upon that account. So long as measures remain unequal, it is impossible to fix the assize of bread upon any thing like equitable principles, without taking a fair average of a whole market, such as is done, with great propriety, at Haddington; at the same time, this expedient, however much, under existing circumstances, it deserves to be applauded, cannot procure a correct assize of bread. No; this can only be accomplished where measures are uniform, or where grain is sold by one fixed rule.

Sdly, THE diversity of measures is injurious to the public at large. The corn trade of Britain is of great and general importance, and the import and export of that necessary article affects the interest of a greater number of people than any other measure of political economy. By the existing laws, the ports for importation and exportation are opened and shut according to the lists of average prices, returned by the sheriffs of the different counties to the corn inspector at London. When the amazing differences among the customary measures are consi-

dered, it will be found almost impossible to reduce them correctly to the size of the Winchester bushel. Hence the grossest errors are to be found in those returns, which any person may be satisfied of by examining the general averages of the districts into which the kingdom is divided; nor can it be otherwise so long as a diversity of measures continues. The errors of these averages equally affect both the grower and consumer of corn. If the ports are opened earlier than they would have been, had the average been fairly ascertained, the farmer, who probably took his farm upon the faith of foreign corn being excluded, till prices reached a certain height, is necessarily injured; while, *vice versa*, if the ports are kept longer shut, than a fair average would have warranted, the consumer has an equal right to complain.

ANOTHER circumstance attending the diversity of measures, very injurious to the public, is, that in making up the annual fiars of grain in Scotland, the same errors, as are already stated, must happen in settling the assize of bread. The customary measures raise the fiars

higher than they would otherwise be exactly according to the number and excess of those adduced in the proof. By the fiars of grain, many bargains are settled, and many rentals and stipends in Scotland are paid ; any measure, therefore, which contributes to regulate them upon surer principles, would be of importance to every person concerned in payments ascertained by that rule.

BUT we need not attempt to prove the baneful consequences attending a diversity of measures, or the benefits which would follow from their being permanently fixed, because these things have been acknowledged in all ages. To reduce weights and measures to fixed standards has repeatedly employed the attention of the Legislature of both nations. In Scotland, from the days of David I. to the Union, more than forty acts of Parliament were passed concerning weights and measures ; and, in the statute-books of England, from *magna charta* to the present time, a much greater number may be found. As these acts have failed to procure uniformity, the conclusion must be, that this salutary object cannot be attained, while measures of capacity are continued. We are therefore led to infer,

that selling corn by weight is the best way of removing every inconvenience sustained by the public in the diversity of corn measures.

It is unnecessary to inquire at what period measures of capacity were introduced into this country. But there certainly was a time when corn, as well as every other commodity, was bought and sold by barter. Let us, therefore, return to first principles, which is always the surest way for rectifying abuses. Let us suppose we had no established measure of capacity for selling the produce of the soil, but that every part of it was exchanged for what it would bring. Let us also suppose that the country possessed a stone called *a pound*, and that the weight and size of that stone were exactly ascertained : Under these suppositions, could any thing be more natural and fair than for the person who possessed corn to say to him with whom he had been in use of bartering that article, “ We have hitherto been dealing upon loose principles. I have given you the produce of my land, but am ignorant of the quantity you received, and of the value of the article I got in return. I will therefore give

you corn according to the weight of this stone for so much money, and our dealings will not be exposed to the uncertainty I am speaking of.”

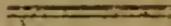
A proposition of this nature, so candid and equitable, it is presumed, would be instantly accepted, and would, from that time, be the rule of their future transactions.

UPON principles something similar to the above might a law be framed for regulating the sale of corn by weight, and for providing a radical cure for the abuses which, from the lapse of time, or other causes, have crept in amongst the measures of capacity. Independent of correcting these abuses, the selling of corn by weight is the most equitable way of disposing of it. The seller must receive a price in direct proportion to the quality of his grain, unless he foolishly sells his sack, or bag, or hundred weight, at a lower price than its worth. Good grain, when properly dressed, will infallibly draw its fair market value, which is not always the case when sold by a measure of capacity; and the finesses practised in filling and rolling the firlet would be effectually prevented.

IT has often been remarked, that neither good land nor good corn draw a price in the market, proportional to their intrinsic value, when compared to inferior sorts. This remark, so far as it applies to corn, appears to be just; selling it by weight would, therefore, in a great measure, remove the objection, as husks and scales, although they fill the firloft full as well, if not better than sound corn, will go short way in bringing down the arm of the beam. We are sensible that inferior grain has more refuse than is to be found amongst the like quantity of good grain; but this refuse cannot affect the purchaser so much when weighed as when delivered by a measure of capacity; at any rate, the skill of the purchaser must in this, as well as in every other transaction, be his guide in fixing the price.

ANOTHER advantage from selling corn by weight is, that it would induce every farmer, both from principles of honour and interest, to dress his grain in a sufficient manner, and to keep the lightest of it for domestic purposes. It is plain that so long as measures of capacity are used, this will not be studied. Sell-

ing by weight would at once annihilate the anarchy and confusion which the discrepancy of measures has introduced into the corn trade. Corn is the staff of human life ; and the cultivators of the ground may be considered as the first and most valuable of all our manufacturers. The importance of the corn trade claims every mark of legislative attention ; and sound policy, and true wisdom, call for countenance and protection to those employed in this the most valuable as well as the most necessary of human arts.



SECT. II.

Of Roads, and the System enacted by Law for making and repairing them.

No country can be improved, unless considerable attention is previously paid to the making of roads or lines of communication through all

its different parts. In Britain, perhaps, more money is levied from the public for making and repairing roads than in any other country of double the same bounds; hence a facility of travelling and carrying goods and produce from one district to another, greater than known in other countries, is experienced on every hand. The roads of the island, however, are far from being so good as they ought to be, considering the immense sums annually expended upon them. To describe the system according to which roads are supported and managed, may perhaps lead to a developement of the causes which prevent or obstruct an improvement of their condition. That system is in many respects radically bad, and perhaps, like every other of a public nature, must constantly remain defective and inefficient.

ROADS may be considered as of two kinds: 1st, Those that constitute the great leading communications from town to town: and, 2dly, The parish or bye roads which lead from farm to farm, or from village to village in the first instance, and ultimately communicate with the

great and leading roads. Those of the first description are almost in every case under the turnpike system, which certainly is the most equitable one, because, according to its rules, no person can be charged for the support of a road unless he travels over it, and thereby obtains benefit from the money expended in supporting and repairing that road. Those of the second description are made and repaired either under the provisions of the general statute-labour act, or of particular acts which most of counties have at different times obtained from the Legislature, for regulating and directing the levying and appropriating of that statute-labour. Generally speaking, statute-labour is now only paid by the occupiers of land, though originally every householder was bound by law to work six days annually upon the roads. In fact the support of the parish or bye-roads in Scotland may be considered as a burden upon the tenantry, though intended by the ancient laws to fall upon all classes of the community. No doubt, a commuted sum in lieu of statute-labour is still levied from the inhabitants of some towns, and even from those of country villages in particular districts, but the money raised in this way is of so

trifling amount as hardly to merit notice when the bye road system is under consideration.

THE general statute-labour act of Scotland was passed in 1667, and afterwards amended in 1720 by the Parliament of Great Britain. Both these acts are still in force, though, as already said, most of the counties have obtained from the Legislature particular acts for regulating the administration of their statute labour. By the original act of 1667, it was directed that the occupiers of land should annually furnish six days of a cart and two horses for every plough they kept, and that every cottager or householder should perform six days work for repairing the roads. A very small sum under the name of bridge-money was laid upon the proprietors of land, though it must be evident to every unprejudiced person, that no class of the community is more interested in the repair of public roads than the one composed of landed proprietors.

THE inefficiency of the general statute-labour act of Scotland for procuring good roads was early ascertained, though the system was not partially departed from sooner than 1751, when the first

Scotch turnpike act was applied for, and obtained, by the county of Haddington. Statute-labour, however, remained upon its former footing till 1769, when the foresaid county of Haddington procured an act to be passed for commuting labour into money, which act has been generally followed, and in some respects imitated, in almost every other county of Scotland. The Haddington act contained an excellent provision, enabling the justices to raise the original commuted value of six days work of a cart and two horses, proportionally with an increased advance of the value of labour. In 1770, when the act was carried into execution, six days work of a cart and two horses was rated at twenty shillings. Afterwards it was increased to thirty shillings, and this year a further addition of ten shillings has been made, which is still greatly below the real value of the labour directed by the act to be performed.

WHAT we have stated will show, that both landed proprietors and the legislature were perfectly aware of the manifest benefit which the public would obtain from the improvement of the public and bye roads. Whether the best

methods were taken for making and repairing these roads, consequently for procuring that desirable benefit, is a separate question. In short it is one that would require more ample discussion than practicable under the limits of the section now occupied.

THE subject cannot, however, be dismissed without offering one or two remarks upon the statute-labour system. The system must be radically defective, because it is founded upon the principle that the roads of every parish can be maintained in good condition at the like expence, notwithstanding it is manifest that many parishes have more roads than others, consequently that more money must be required for repairing roads in parishes so circumstanced than in others differently situated. The procuring of materials for making repairs is much more difficult and expensive in some parishes than in others, consequently good roads in all of them cannot be procured at the like expence. On these accounts, it has always appeared to us as a wise and expedient measure, that the heritors and tenants of every parish should be permitted to assess themselves in such a sum as may be re-

quired for keeping the roads within their bounds in good order and condition, it being always understood that the assessment was not to be below the rate fixed by the Legislature. We are quite aware that every parish may expend what sum it pleases in repairing the roads, over and above what it is bound by law, and that the Justices will not call those concerned to account for such over expenditure. This is true ; but without the sanction of an act of Parliament, how could an extraordinary assessment made by the majority of a parish be put in execution against the minority, in the event of such an assessment being resisted ? We are perfectly sensible that many parishes would willingly assess themselves in a greater sum to the repair of the bye roads, than they are legally obliged to do, could the assessment be made effectual against all those concerned ; but it can never be expected that one part of a parish will contribute more than others, when the object to be gained is of general advantage. In our humble opinion, every statute-labour act should contain a clause permitting the heritors of the several parishes to assess those liable for repairing the bye roads in such sums as may be necessary for putting and

keeping them in a complete state of repair ; it being always expressly declared, that the rate of assessment was in no case to be below the rate fixed upon in the Legislative enactment. In England, the repair of any road may be procured by indicting the parish or parishes in which it is situated ; but in Scotland no law exists by which the repair of any road can be enforced ; and provided the heritors of a parish can shew that their statute-labour has been expended, no recourse or remedy lies, notwithstanding the roads of such a parish may be in the most dangerous and impassable state. That good roads every where is an object of great public utility, is a proposition which none will deny ; therefore it follows, that general laws respecting the maintenance and support of public roads can never be effective or useful. The law, in every case, should be framed to meet the circumstances of the district for which it is passed, otherwise the public will never enjoy the benefit of good roads.

SEVERAL considerations here occur, some of which shall be briefly noticed : 1st, As such an immense sum of money is annually expended in making and repairing public roads, while not-

withstanding that immense expenditure, the general state of these roads is by every person of observation acknowledged to be imperfect and defective, would it not be of advantage that a board of commissioners for the management of roads was appointed in each kingdom, for directing and superintending the expenditure of the several sums raised or levied in the different counties, for this important branch of public service? According to the existing system, it is obvious that the heritors of a county are responsible to none for the allocation and appropriation of the money levied within its bounds, except to the Justices of the Peace assembled at the quarter sessions; but when it is recollected that all these justices are also heritors, it must appear that no check thereby lies against abuses when such may happen to occur. Before the union of the two kingdoms, the privy council of Scotland seem to have had a controlling power over the administration of the road work; but that body being dissolved after the union of the two nations, each county has since been left to the freedom of its own will, without being accountable to any tribunal whatsoever for the appropriation or expenditure of the

money levied from the inhabitants within its bounds, towards repairing and supporting the public roads. Were a board appointed for managing the public roads, engineers of skill and capacity would, of course, under their authority, be directed to examine and report upon the state and condition of the roads in each county, previous to the appropriation and expenditure of the money levied from the inhabitants, either as turnpike duty, or in lieu of statute-labour.

2dly, It is a disputable matter whether the heritors or landed proprietors can be considered as the best class of the community for managing and superintending the repairs of public roads; because their habits of life, their local interests, and more particularly their inattention to the minutiae of business, in many respects seem to disqualify them from having the whole administration of a work which requires considerable skill, and the most sedulous attention, to execute in a suitable manner. It has been thought, if the occupiers of land, who have full as much interest in procuring good roads as the heritors, were invested with a share of the administration, that good effects might follow. Something of this kind might probably be useful. Let us

suppose two farmers in each parish, elected at a meeting regularly summoned, were declared by law to be qualified to act as trustees for managing the roads, it may be presumed that the heritors would be greatly benefited by the aid of people so much interested in having good roads; and perhaps many people might think a measure of this nature well calculated to promote the public benefit. Besides, as ninety-nine parts out of a hundred of the statute labour is paid by farmers, it seems fair and reasonable that they should have a vote in the appropriation.

3dly, THE system, according to which statute labour has hitherto been assessed and collected in Scotland, does not seem a fair one; on the contrary, both justice and equity call for imposing the assessment according to principles which meet the present state of society more exactly than those of the ancient statute labour act passed in the reign of Charles II. By that act, as already said, statute labour is directed to be levied from certain classes, while the proprietors of land, and several other descriptions of people, are totally exempted from any duty or tax on account of the coaches, chaises, or saddle horses, which they

may keep, notwithstanding it is quite plain that the repairing of the roads is of as much, if not more advantage, to those classes as to the occupiers of land, upon whom almost the sole burden of supporting the bye or cross roads is thrown by the existing laws. The coaches, chaises, and saddle horses, of gentlemen and others, pay toll as often as they pass upon the turnpike roads; and why an exemption should be made in their favour when travelling upon the parish roads seems difficult to ascertain. In many parishes a considerable addition would be made to the road funds were vehicles and horses not employed in husbandry charged; and, as a good road seems as necessary for their passage as for that of a common cart, no solid objection can be urged against rating them for statute-labour.

4thly, The damage done to the great or turnpike roads by the military on horseback, and carts with their baggage, is considerable, though, in every case, both soldiers, and carriages attending them, are exempted from turnpike duty. The same thing may be stated with regard to coaches carrying the mail, with this addition, that the roads are damaged by the former in a transitory and ir-

regular manner, whereas the latter travel daily, and by the rapidity of their motion do serious injury to every road over which they pass. It has been urged that the matter is just as broad as it is long, for if the military and mail coaches pass over the roads free of turnpike duty, the charges of the war and post-office are on that account lessened, and fewer taxes raised upon the public at large. What is alleged might have some weight did the burdens complained of fall equally upon every county, but being of a local nature, it is maintained that every horse or carriage, no matter whether that horse or carriage is employed by government, or individuals who travel upon the road, should be charged towards its repair, otherwise that the road funds cannot defray the expenditure attendant upon the repair, unless tolls are raised so high as to be burdensome to the inhabitants of the district in which they are situated. We apprehend there is much truth in what is urged, and believe it would be of public benefit were the objection completely removed. A few thousand pounds, nay even one hundred thousand pounds, is a small matter when compared with the revenues of the country; but that sum, taken from the road funds of

the several districts through which the military and mail-coaches pass, is attended with injurious consequences to the roads therein mentioned. In fact, over all Britain, the funds for supporting roads are rather below than above the expenditure, therefore unable to bear such a loss, or to warrant such an exemption as is claimed for horses and carriages employed by the public establishments.

5thly, THE expence of passing acts respecting road work is a grievance of great magnitude, operating severely upon the funds, especially in cases where an opposition takes place, therefore deserves to be considered as highly detrimental to the public interest. It will be recollected that none of these acts being of longer duration than nineteen or twenty-one years, fresh powers are always necessary at the conclusion of these periods; of course the expence of passing new acts, which is generally greater than what was incurred in the first instance, serves to beggar the road funds, and to prevent the roads from being suitably repaired. The expence of a road act is from two to six hundred pounds, according to the number of clauses therein contained, and the

opposition that may take place; but, if the average is taken at four hundred pounds, it will not be far from the mark. The value of that sum, for nineteen or twenty years, may be about forty pounds *per annum*, and to that extent the roads of every district in the island may be considered as burdened towards the support and maintenance of the officers of Parliament. But why a road act, like a canal act, may not be passed for an indefinite period, we are at a loss to learn.

FROM the above circumstances, it appears that the present mode of paying the servants of the legislature is eminently hostile to the roads of Great Britain, swallowing up a considerable part of the funds destined for repairing them, and of course obstructing, to a certain extent, the benefit which the public might otherwise enjoy from the passing of these acts. Would it not be better were the servants of Parliament paid, like other public officers, out of the revenues of the state, and not by fees on the different private bills passed into laws by the legislature? Certainly it would. A law to promote improvement ought on no account to be taxed. On the contrary, every encouragement ought to be given to

such laws, whether meant for repairing roads, making canals, building bridges, or dividing and inclosing common field land. A stranger, however, would feel surprise on being told that these are the very laws for the passing of which high fees are rigorously exacted. Surely it is full time that this preposterous way of paying the servants of Parliament was completely abolished. Such a mode of payment is something similar to the old custom of giving vails to the servants of noblemen and gentlemen, a custom now thoroughly removed. You could not *then* dine with a great man without feeing all his servants, and paying in fact a great deal more for your dinner than what might have been obtained for at a tavern. In like manner, you cannot *now* get leave to repair a road, or make improvements of any kind, without giving vails to all the officers of Parliament from the chief clerk down to the honest door-keeper. It has often been remarked, that the laws and customs of Britain are framed in such a way as to retard rather than promote the improvement of the country ; but, whatever truth may be in the general remark, it is plain and obvious, if it is restricted to the matter under consideration, that paying the officers of Parlia-

ment by a kind of per centage on all improving bills, is not only detrimental to the prosperity of the country, but directly in the teeth of all improvements, whether national or local, public or private, that require the sanction of the legislature before they can be carried into execution.

SOME general observations with regard to the forming, making, and repairing of roads, may not be unnecessary.

IN the *first* place, all public roads ought to be of sufficient breadth, otherwise room for one carriage to pass another safely and comfortably cannot be obtained. By sufficient breadth, we mean that the public or turnpike roads should not be narrower than forty feet from fence to fence, twenty of which should be covered with hard materials, and the remainder properly shouldered up to these materials, so as carriages may take upon the sides during the period of dry weather. The parish or bye-roads may be considerably narrower, though not less, than thirty feet from fence to fence ; and, if twelve of these are covered with hard materials, properly broken and spread, those who travel them may be very well

accommodated. The ruts, in every case, should be regularly filled up, and no water suffered to remain upon the roads a minute longer than it is practicable to remove it.

WHEN a new road is to be made, the first business is to form it in a regular manner, either by the plough or spade, so as the materials to be afterwards applied may be deposited in a proper bed. A gentle acclivation to the centre seems beneficial, as a descent to the water which may fall upon the road is not only thereby given, but the bottom or subsoil of the road is in that way kept in a drier state than it would be were the hard materials laid upon a flat surface. This being done, and ditches or drains digged on the outside or extremity of the road, it is proper to give, in the first place, a close and compact bottom of large stones, to the depth of twelve inches, and great care should be employed to lay them in a regular manner, so as they may not afterwards start up and break through the surface. Upon these stones a covering of hard materials well broken should be laid, the deepness of which may be six or eight inches, according to circumstances; and if a blinding of small gra-

vel, or, failing that, of sand, is given to the hard materials, a sound and good road is at once procured. The expence of such a road varies greatly according to local circumstances. It rarely, according to the present value of labour, can be less than four hundred pounds Sterling, and, in some cases, it may even amount to one thousand pounds per mile ; though, ultimately, such a mode of making a road will be found to be the cheapest and most effectual.

IN repairing a road, measures of a direct contrary nature should be adopted. So long as the bottom, base, or substratum of the road, continues in good condition, a slight application, say three inches of hard metals well broken, is only required, and afterwards, the most efficacious way is to confine the repairs to filling up the ruts or tracts made by carriages upon the roads with stones broke very small, and by levelling the *briggs*, as the excrescences are commonly called, thereby keeping the road surface smooth. The second mode of repair (filling up the ruts) can only be properly executed when the weather is wet, as, at other times, the stones do not bed or consolidate. The other ought never to be attempted

but during dry weather, for, at any other time, it would place the road in a state of puddle, and increase the evil meant to be remedied. All substantial repairs upon roads ought to be given in the summer season, and none left to the winter and spring months, except the partial ones of filling up the ruts, and the like, which at no period should be dispensed with. Such arrangements, however, are too much neglected, and of course the roads, and the funds destined for their support, are in like manner wasted and deteriorated.

WHAT is stated chiefly relates to the great public roads. Of the parish or bye roads it is impracticable to speak with the slightest degree of precision, because the statute-labour (we mean the money levied in place of that labour) is applied in such a discordant and irregular manner that good roads cannot be procured, under the present system, however faithfully the funds may be administered. In many parishes the work is divided, or rather frittered down, into so many insignificant patches, that nothing to the purpose can be reasonably expected from its appli-

cation. Many roads are also suffered to remain open which, without prejudice to the public, might be shut up. We repeat, what has been already stated, that, unless the administrators of the road funds are made accountable to some tribunal or other for their management and intromissions, it is in vain to expect that the public will enjoy the full advantages which may be obtained from the increased and increasing expenses of the road administration.

CONCLUSION.

HAVING now described in a circumstantial manner, the present state of British husbandry, we shall proceed to the obstructions which are in the way of its progress to perfection. In South Britain, these obstructions are numerous; all tending to stop the improvement of the soil, and to lessen the value of landed property. Be-

sides the want of leases, and the general nature of covenants, which govern the tenantry, the influence of poor rates, tythes, and other public burdens, is hostile to agricultural improvement. In addition to these, the extent of land held upon common-field tenure, together with the large portion legally kept in a state of waste, all render the husbandry of South Britain much inferior to what might be expected, under the circumstances of soil, climate, and markets, with which the country is favoured.

IN a preceding part of this work, some observations were offered upon the pernicious consequences to husbandry from the want of leases, and it was also remarked, that the general tendency of restrictive covenants was inimical to improvement, nay even adverse to the interest of those who imposed them. Referring to what is there stated, we shall now say a few words upon the inexpediency and inutility of keeping land in a commonable state, and describe the pernicious consequences which flow from burdening it with tythes and poor rates, according to the present system. In our opinion, both these burdens might be arranged in such a way as not to stop

improvement; and, perhaps, it would not be a difficult affair to place the whole land of the kingdom in a state of severalty, were the legislature disposed to take up the business in a decisive manner, or to view it as one materially affecting the general welfare.

THE *first* obstruction to English improvement which shall be mentioned, is the immense tracts held in a state of commonty, whether arable or waste, by which the capital stock of the nation is abused and misapplied, making a return not one half of what it is capable of affording, thus lessening considerably the produce of the country, and preventing that increase of population, which otherwise might be supported and kept in employment. We are quite aware that strong measures are necessary before the commonable lands can be divided and placed in a state of severalty; but why not put strong measures into execution, since the national welfare depends so much upon them? The country has shewn, in many recent instances, that strong measures are not contrary to the national disposition; therefore, why should a similar one be delayed, when an object of material importance is

at stake? In the ordinary way of dividing commonable land, we venture to say, that the object will not be gained in a couple of centuries, even though division bills should be as numerous as they have been for many years past. A general bill would greatly lessen the evil complained of, would save an immense expence to those concerned, and separated from inclosing (which we view as an unnecessary appendage) would soon place the whole country in a cultivated state; at least, it would enable the owners of commonable land to participate of the benefits arising from holding land in severalty, whenever they were disposed to partake of such an advantage.

In the *second* place, so long as the tenth of produce is exacted from the farmer, it is unreasonable to expect that agriculture will be much improved, because 10 per cent, upon the general run of improvements, is, of itself, a great profit, after the ordinary expences are defrayed. No person, therefore, will step out of the beaten path while the profits of improvement are to be drawn by another, who is not at any part of the expence, who runs none of the risk, and who experiences none of the trouble attending

the improvement, except what necessarily accompanies the receipt of an increased quantity of produce.

Tythe, though apparently an equal tax, is, in reality, more unequal than any tax yet devised. On poor soil, the tenth of the crop, though nominally exigible upon the same ratio, is more severely felt by the possessor than when paid from good soils. To those who have studied the subject, an explanation may be superfluous; but to others, who are not so versant in political economy, it cannot be improper to elucidate an opinion which, without some explanation, may have a paradoxical appearance.

ALL poor soils, like land in its natural state, require considerable outlays before they can be rendered fertile and productive. There is not much hazard in maintaining, that five quarters per acre may be gained at less expence upon rich loams and clays than three quarters per acre from thin clay and moorish soils. These inferior soils require more manure, more labour, as much, if not more seed, than soils of the first description, consequently the disposable balance,

from which tythe must be paid, is out of all bounds diminished. In the one case, tythe will amount to about 17 per cent. of the disposable produce; whereas, in the other, it will be found not less than 32 per cent. a difference which few people ever troubled themselves to calculate. Wishing to make the subject perfectly understood, a few figures in illustration are subjoined.

TAKE the crop on a rich field of loam or clay, at 5 quarters per acre on an average, <i>inde</i> ,	-	5	qrs.	0	bush.
Deduct seed on an average of grains,	-	4	bush.		
Corn for working stock	6				
Ditto for farm servants,	3				
Ditto for incidental ex- pences, such as har- vest work, tear and wear, &c.	-	4	2	1	
		<u>4</u>	<u>2</u>	<u>1</u>	

which leaves a disposable balance of two quarters seven bushels per acre, as a fund from which tythe can be paid. But as the whole crop is tythable, the amount thereof is four bushels or nearly 17 per cent. on the disposable produce.

TAKE the crop on thin clay or moorish soil, at three quarters on an

average, <i>inde</i> ,	-	3 qrs. 0 bush.
Deduct seed,	-	4 bush.
Horse corn,	-	6
Farm servants,		3
Incidents,	-	3
		<hr/>
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which leaves a disposable balance of one quarter per acre, as a fund from which tythe can be paid. The tythe of three quarters is two bushels two pecks, or thereby, or nearly 32 per cent. on the disposable produce per acre; though, in the last case, the incidental expences are stated at one bushel per acre less than in the other, which, where good management is practised, may be a questionable circumstance.

THUS it appears, that the possessor of good soil, who raises five quarters per acre, pays tythe, when it is collected in kind, at the rate of 17 per cent. of the grain remaining in hand, after the expences of working the same are defrayed; while the possessor of inferior soils,

who raises three quarters per acre, pays at the rate of 32 per cent. though the tax, at first sight, is precisely the same in both cases. After this statement, which, it is presumed, as a general illustration, will not be found far from the truth, can it excite surprise that waste lands, and inferior soils, remain unimproved among our southern neighbours?

WE might now shew in what respect tythes prevent the cultivation of waste lands, were we not fully sensible that few people are so ignorant as to deny the truth of this proposition. Indeed to attack tythes merely upon account of their consequences, is little better than attacking a man of straw, who is incapable of making the slightest defence. It is not concerning their utility or expediency that economists are at variance. Upon these matters almost every one is agreed who has investigated the subject. The difference which prevails arises entirely from the difficulty of making a just arrangement, where so many interests are concerned. If tythes, however, prevent improvement, or, in other words, occasion the national stock to remain unimproved, every friend to his country will join in de-

claring that a remedy is desirable; nay, if a strong measure is even necessary to remove that evil, such will be considered as a duty incumbent upon the government of the country, and one which ought not to be disregarded.

PERHAPS the difficulty, not the inexpediency of a commutation, has hitherto prevented any measure of that nature. It has been proposed to value all the tythes presently paid, and to make that valuation the rule of payment in all time coming. But to this it is objected, that no regard would in that way be paid to the gradual depreciation of money, consequently, that the real value of the payment might annually be diminished. The plan established in Scotland has also been recommended; but, though the evil might in that way be effectually removed, yet the right of impropiators being now better secured than in Charles I. days, it is evident such a plan stands little chance of being adopted. Again, a corn rent has been proposed by some people, while others have suggested, that a certain part of all tythable land should be set apart, instead of an annual payment. To all these modes of adjustment, strong, and in our opinion, valid objections may be offered. Corn

is but an awkward article for clergymen to deal in ; and, at any rate, payment in that way could not apply to pasture and waste land. Besides, it would open a door for constant disputes about the quality of the article delivered. The other mode of adjustment, viz. giving land instead of tythe, is still worse in a national view. It would put such a quantity of land in a state of mortmain, as might increase the evil meant to be corrected by the commutation.

FROM these considerations, it appears that no method can be devised for regulating tythes sufficient to remove the evils attendant upon the present system, and secure so effectually the interest of all parties, as a general law fixing a payment in money according to the rentals of the land from which tythes are exigible ; it being plain, were such a law carried into execution, it would effectually do away the complaint against tythes as being an obstacle to improvement. It would allow the proprietor to receive the full value of his company concern ; secure the tytheholder in his share of the property, as ascertained by the legislature ; and prevent the farmer from being deprived of the benefits flowing from

such meliorations as he may make on the land which he occupies.

By a plan such as the one we have in view, an important agricultural grievance would not only be removed, but the public interest, as well as that of individuals, would be materially advanced. The public would be benefited by a general introduction of convertible husbandry, and by the culture of that large portion of the island, which, to the shame of our government, is suffered to remain almost in a non-productive state. The landed proprietor would receive the full value of his property, as a removal of tythes would instantly occasion convertible husbandry to be generally disseminated, and be the forerunner of a great rise of rent. The tytheholders, whether clergymen or lay impropriators, would likewise participate in the general advantage, by having a fair share of the advanced rent. At the outset, it is probable, that the amount of tythes would exceed, at least it would be equal to, the tax in kind, or the money presently levied in lieu of it; while all the drudgery, all the ill will, which inevitably fall to the lot of the collector, would be avoided. As to the farmers, they would most likely gain more than

the proprietors or tythe-holders by the establishment of such a commutation. They would be free of arbitrary exactions levied in direct proportion to the extent of their merits and abilities. When improvements were made, they would be secured from the interpositions of a third person; and rent being fixed, no demand for a share of profits could be made during the currency of a lease by any person whatever.

WE now come to poor rates, which are still a more uncertain burden upon the tenantry than tythe, and which alter and vary according to the prosperity of the country, and, in some respects, according to the manners and disposition of the lower ranks, more so than their actual wants or necessities. It is not our object here to discuss the expediency or utility of the present system, but merely to consider it as affecting agriculture, and as hostile to improvement. We are therefore convinced, that every indefinite burden must be injurious to those who enter upon the profession of agriculture; because, when they agree to bear the public burdens which affect the land under their occupation, they cannot know the extent of that burden till it fall upon them; therefore, as it is more or less

heavy, so will their condition be good or bad, according to the weight of the burden, or the extent of the tax which falls to their share. Viewing the matter in this light, we have long thought, that if all these public burdens were defrayed by the proprietor, agriculture would be greatly benefited, while the rent rolls of proprietors would be increased in a degree much exceeding the public burdens devolved upon them. We see this to be the case in North Britain, and why the like effect should-not happen in the neighbouring country we are at a loss to discern. Besides, were these burdens sustained by proprietors in the first instance, we are almost certain that a more economical management would take place than what is exercised under the existing system. Were the payers to be the distributors, it is more than probable that the abuses of the poor rate laws would soon be corrected, though there is small prospect of any remedy so long as the present system continues.

THE legal polity of Scotland, as it affects the occupiers of land, is much more favourable to agriculture than the English system, though still it has defects which might be remedied without

injury to proprietors. These may appear from the following considerations :

IN the *first* place, the situation of cultivators, though undoubtedly much improved, remains more precarious and dependent than that of merchants and manufacturers. In various points of view, the former have less command of their property than the latter ; the property invested in rural improvement not being convertible into money with the same facility as may be exercised with that devoted to trading purposes. Under these circumstances, persons possessed of property are deterred from laying out any considerable part of it in the improvement of land ; because it cannot be called back when wanted, or even destined to purposes which the owner may wish ; but were leases rendered a marketable article, these objections would in some measure be removed. Were the legal system of Scotland formed in such a way as to allow the settlement of a tenant's affairs to be as easy a business as that of a merchant or manufacturer, great benefit would follow. Could a lease be sold, or subset at the tenant's death, and the stock upon the farm converted into money, the interest of all concerned would be greatly promoted. Ac-

According to existing regulations, a partnership in agriculture is an impracticable measure, at least it is an imprudent one; but, were things otherwise regulated, were leases allowed to be sold, partnerships would frequently take place, much to the benefit of those extensively embarked in agriculture. Agriculturists, as happens with other people, have different talents; some are better calculated for managing arable farms than for general purposes; others may be qualified for attending markets, or may be good judges of live stock. Blending these different qualifications in a partnership would therefore be useful, though it is evident that arrangements of this nature cannot successfully take place under the present system.

IN the *second* place, agriculture would be benefited were leases of longer continuance than 19 years, protected from the claims of singular successors. Such *singular* successors would not thus be placed in a worse situation than the direct heirs of the granter; and why they should be placed in a better one, we are at a loss to conjecture. A law which declared every lease to be legal and valid, that was regularly executed, no matter what were its duration and

terms, would be attended with incalculable advantages. Should it be urged, that such a law would prove injurious to heirs and expectants, we answer that the injury, in such instances, would be less than when sales are made; and as every person, not restricted by entail, may sell the subject which belongs to him, no solid reason can be adduced why he may not make a partial disposal of the same for a limited time.

IN the *third* place, were leases considered as property, numberless evils would disappear which at present obstruct and incommode agriculture. We cannot figure the injury which proprietors would sustain were this character bestowed on leases, though it is not difficult to recognise the advantages which would follow. Every circumstance which contributes to place the holder of a lease in a more respectable condition necessarily tends to increase the value of landed property. The system of connexion betwixt landlord and tenant is constructed upon more liberal terms in Scotland than in England; hence a given spot of ground yields much more rent in the former than in the latter country. But were impediments done away as we have suggested, the difference would become more

and more evident by the rapid spring given to agricultural improvement.

Lastly, were every feudal custom abolished, and tenants placed on the same footing with other members of the community, the public good would be considerably increased. Were leases framed on plain and solid principles; were their conditions to be the only law obligatory on the parties; were every reference to ancient custom and usage given up and done away; and were all attempts to put constructive burdens on the tenant prohibited by an express act of the legislature,—then might agriculture flourish with rapidity; the occupiers of the ground advance in character and reputation; the country increase in durable riches; and the condition of all ranks, from the lowest to the highest, be meliorated and improved. The soil has, in more than one part of this work, been considered as the capital stock of the country; and if so, every measure which serves to improve that capital stock must be regarded as contributing to increase the national prosperity.

APPENDIX.

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APPENDIX.

No. 1.

THE following Letters, supposed to be written by a young farmer to Mr Jamieson—a gentleman whom the young farmer formerly served as an apprentice, were originally published in the FARMER'S MAGAZINE. As these letters display in clear and forcible terms, the condition and circumstances under which every farmer is placed during the first year of his lease, it is thought advisable to reprint them in this work, especially as they contain a brief and practical illustration of the rural doctrines inculcated in the preceding chapters. At the same time it is proper to state that these letters are reprinted with the express permission of MESSRS CONSTABLE & Co. proprietors of the Magazine, these gentlemen having, in the most frank and handsome manner, permitted the Editor to make use of them on the present occasion.

Letters from a Young Farmer to Mr Jamieson.

February 8th.—Having concluded an agreement with the proprietor of the farm mentioned in my last, permit me to crave your advice with regard to my future conduct. I am encouraged to take this liberty, by a remembrance of your former kindness, and also by an impression that the firmest dependence may at all times be placed upon your prudence and judgment. Do, my dear Sir, favour me with your assistance on this occasion ; for, if I once go wrong, it may be a long while before I get right. Listen with patience to my desultory opinions ; and examine with attention the crude and undigested schemes that may be presented. Correct me when wrong, and keep me from straying into the paths of error. Often have you told me, that perfect management could only be learned in the school of practice ; and that a long attendance was necessary before the ablest scholar could merit the character of a good agriculturist. All these things now rush upon my mind when I am going to enter into rural life, and urge me to unbosom myself to one capable of affording the aid that is wanted. Excuse these egotisms. Attribute them entirely to that anxiety which every one must, less or more, feel on such an occasion ; especially if without confidence in his own abilities.

The farm I have taken contains three hundred Scotch acres, divided into eighteen enclosures, and pretty well situated, both as to obtaining a full supply of lime, and to good markets, where produce of all sorts may be readily disposed of at a fair price. The soil is of different qualities and varieties ; one half of

it being a strong deep loam approaching to clay, and naturally well calculated for the culture of beans and wheat; about fifty acres are of thin clay, capable of carrying wheat if well manured, but apparently unfit for an extensive rotation; and the remainder is good turnip soil, though not of a gravelly nature; therefore, able to carry peas and beans. The whole farm is in tolerable good order at present, having been preserved in shape by the former tenant; that is to say, he was not permitted to take two white crops in succession during the last five years of his lease;—a regulation which, so far as I know, has been strictly adhered to. According to the lease, he was also bound to leave one sixth of the farm in grass of different ages; and the like quantity uncropped, as a turnip or fallow break; which prestations are complied with. He is likewise bound to leave the whole dung of the penult crop upon the premises for the use of his successor; so, from these things, you will see that my entry cannot be considered as an unfavourable one. For the dung, and the land that is uncropped, value is to be paid him, according as the same shall be ascertained by neutral men of skill and capacity mutually appointed. The condition of the houses and fences is also to be submitted to neutral men. Here, my dear Sir, allow me to request that you would act as my arbiter on this occasion. The matters to be determined are of some importance to me; and I am the more anxious to have my interest under your guidance, since I learned from my father that heavy losses, on one side or other, are often sustained, when unqualified persons sit in judgment. The clause with regard to fences bears, that they are to be

capable of keeping in cattle and sheep ; and as to houses, that they are to be in good habitable condition. To me these terms appear loose and unprecise ; though to persons of experience, their meaning may not be doubtful.

I come now to the rent agreed upon, which I am fearful may be too high ; but, being offered under the express sanction of my father, must be reckoned as not higher than the market value of similar soils. In short, the rent agreed upon is one thousand guineas, or three pounds ten shilings per acre, which is a smart one, especially as the public burdens, say property-tax, horse-tax, window lights, statute labour, &c. must be added ; and these may be computed at ninety pounds, or six shillings per acre more. My father, in valuing the farm, trusted much to the goodness of its condition, and the regular mode of cropping exercised for several years ; and assured me that, under different circumstances, his estimate would have been curtailed considerably. He added, that he has known farms newly taken, where one year's rent could not be paid out of two crops ; whereas, in the present instance, the rent might nearly be paid at the outset. This, to be sure, is an important matter ; freeing me from an expensive outlay in the first instance, which, in fact, would operate afterwards exactly in the same way as so much more rent. I wished greatly to have had the benefit of your advice before the transaction was concluded ; therefore, felt much concern when I learned that your other engagements prevented us from obtaining it.

Allow me, in the next place, to solicit your advice concerning the most suitable rotations of cropping for the several soils described. I shall throw out my crude ideas on that subject, submitting them entirely to your better judgment.

First.—On the strong loam, I am inclined to think that an eight course shift may be most profitably followed, especially as that soil is divided into eight enclosures, some of them more, some of them less, than twenty acres, which would cause the arrangement to suit well when grass was resorted to. The rotation might commence with a complete summer-fallow; 2. go on with wheat and grass seeds; 3. pasture; 4. pasture; 5. pasture; 6. oats; 7. beans; 8. wheat. My father thinks, as the land is well enclosed, and profits from grass husbandry on the increase, that the benefits of this rotation may exceed those to be obtained from employing the plough more extensively; and that whilst only one dunging was required during the rotation, the whole crops may be expected good from the vegetable manure accumulated during the three years of pasturage.

Second.—On the thin clays, it appears expedient to exercise a gentle rotation, otherwise full crops cannot be expected. Say, 1. summer-fallow with dung; 2. wheat and seeds; 3. clover and ryegrass; 4. oats. You have often told me, that grass-husbandry did not pay on such soils after the first year, and that as good oats were got after one year's grass as after three years. Satisfied that these sentiments are well founded, I propose that the fifty acres of thin clay should be di-

vided into four breaks, and cropped in the way described. According to any other plan, the same quantity of produce cannot be obtained at so little expense of labour. In fact five, or at the most six ploughings, are only required during the whole rotation.

Third.—As to the light soils, I am clear that turnips should be the basis of any rotation that may be adopted. This, I know, will gain your approbation. I am more doubtful about the after crops; but let me suppose the course to be as follows: 1. turnips; 2. wheat on the portion of ground cleared by the first of March; barley on the remainder; grass seeds to be sown with both; 3. clover and ryegrass, either to be used in soiling, or manufactured into hay; 4. oats; 5. peas and beans drilled; 6. wheat. There being one hundred acres of light soil, this gives about $16\frac{1}{2}$ acres for each break. My father says the rotation is a good one, if dung can be administered twice in the course of it; a point which cannot be ascertained at the present moment.

Now, let me bring the crops of the several rotations into one view, before calling your attention to the number of men and horses that will be required in their cultivation. Upon looking back, it appears that there will be nearly thirty-seven acres of wheat upon the strong loam; twelve and a half acres upon the thin clay; and twenty acres upon the light soils, supposing one half of the turnip break cleared in time, making, in all, seventy-four and a half acres annually under wheat. The extent of barley ground will be eight acres and a half, or thereby; of oats about forty-eight acres;

of beans and peas about thirty-five acres; of turnips nearly seventeen acres, besides thirty-two acres of plain summer-fallow. The total number of acres, therefore, under the plough in one season, according to these rotations, is two hundred and fifteen; whereof one hundred and thirty-one will carry white corn crops, and fifty-two beans, peas and turnips; whilst eighty-five acres are in grass of different ages; and the remainder of the farm, viz. thirty-two acres, under the radical preparatory process of summer-fallow. In my humble opinion, the above sketch is not far amiss, especially as it includes the cropping of various soils, whose properties are so dissimilar, as to render what may be called good management upon one of them altogether inexpedient upon the others.

Do you think five ploughs and ten horses will be quite sufficient for carrying on the work I have chalked out? or would you consider six to be necessary? To save a plough in these times, is the same thing as to save one hundred guineas; though I am well aware, if the strength kept is below the work to be executed, that every saving in the first instance will ultimately turn out a real loss to the person who attempts it. Still, as I remember that a plough with you cultivated more acres than I have mentioned, and know that an extensive farmer in this neighbourhood, whose farm is chiefly composed of loam and clay soils, had last season 330 acres under grain crops, whilst his strength did not exceed ten ploughs;—I say, when I reflect upon these circumstances, I cannot conceive that five ploughs will be insufficient for working the farm that I have under-

taken. If I entertain any doubts, it is with regard to the summer work ; because a defect in any part of what may be called the radical processes, is felt during the whole of the rotation, of which they form the basis. But, as a supernumerary horse may be useful, and serve to keep labour agoing when a casualty occurs, I can, with such an auxiliary, get on with horse-hoeing the drilled crops ; at least, that necessary work may thereby be considerably assisted. Besides, as my spring work will not be extensive, the turnip and naked fallows can be earlier prepared than otherwise would be practicable. Little more labour will be required for the turnip break, than formerly allotted to the same extent of barley ground ; and, by performing that labour at an early period, the work of the season will be thereby greatly advanced.

I have engaged five married servants as ploughmen, and two as labourers at odd work. Each of them is to get 12 bolls of oats, 3 bolls of barley, and 2 bolls of peas, with maintenance for a cow through the year ; the carriage of what coals are wanted, land for sowing a peck of lintseed, and land for planting potatoes to the extent of one-tenth of an acre. The servant who is to sow the corn, gets also a pair of shoes ; and if he continues with me till next year, he is to receive half a boll of wheat, or the value of it, for stacking the crop : the whole are to have maintenance in harvest. But as I will not have any harvest work for this year, it is stipulated that each man is to receive three firlots of oatmeal in lieu of his maintenance.

The fallow and turnip breaks left by my predecessor, got one ploughing from him, according to the lease, for

which he is to receive payment. I am endeavouring to engage people in the neighbourhood to cross-plough the part intended for turnips as soon as the weather permits; and will also try to get the plain fallows cross-ploughed as early as possible. Upon inspecting the fields diligently, my father is of opinion, that no more than 12 acres can this season, with propriety, be under turnip crop, there being a hazard that the ground would not in time be suitably prepared. I have offered 12s. per acre for the first and second furrows, and 2s. per acre for each close double time of harrowing: and am in hopes these offers will be accepted. The rest of the work may be delayed till I am in possession. Advise me what sort of stock will be most eligible for the grass land at Whitsunday. Very likely, as there are no restrictions upon my predecessor in that respect, it will at that time be eaten down to the roots; therefore, to close up the fields for a month may be a prudent measure. Ten acres of the grass land were seeded last year, and are not to be touched by my predecessor; so I will not be scarce of horse food at entry; but there is no restriction with respect to the remainder.

I have given directions to a neighbouring tradesman to make ploughs, carts, harrows, &c. for me, all of the best quality. With regard to the plough horses, my father is clear that it will be best to purchase them at the fountain head, *i. e.* at the West-country markets; though he says, we may look at any rroups at the time in the neighbourhood, and see if any are there to be procured. In all these matters I shall be directed by

my father. His advice shall never be disregarded; nor will I at any time act contrary to his sentiments. He knows business, and I am only beginning to learn it; though, with assistance from him and my *quondam* preceptor, I may in time be able to render similar aid to other people.

Upon looking over what is said, I find the thrashing machine on the premises has not been noticed. The machine is a good one, and in a complete state of repair; therefore I have offered to take it at the valuation of the celebrated Mr MEIKLE, a person to whom agriculture is undoubtedly under the greatest obligations. My predecessor agreed to this proposal at once; adding, that, from his personal knowledge of Mr MEIKLE, he was sure the business was in good hands. You are also well acquainted with that ingenious mechanic, therefore I inform you, with pleasure, that a subscription has been lately opened *in his behalf*, under the auspices of SIR JOHN SINCLAIR, Bart. a gentleman well known to you, which promises to secure a suitable reward for the inventor of the thrashing machine, and the members of his family, that remain in an unprovided state. I do myself the pleasure of enclosing one of the subscription-papers; confident that every exertion will be made to fill it up in your neighbourhood, so as the last days of a venerable and good man may be rendered comfortable and agreeable.

March 16.—Sowe cannot have your aid in settling matters with my predecessor. Surely, my dear Sir, more than ordinary delicacy is felt, otherwise you would not decline acting as arbiter on my behalf, for no better reason than

that I resided twelve months under your protection. The obligation then conferred was on your side, not on mine; and furnishes no cause for supposing that the strictest impartiality would not be exercised, when the duties of an arbiter were to be discharged. However, I am obliged to you for recommending another person for that office, and shall without loss of time wait upon him, and request his assistance.

April 16.—Grass-seeds were sown a few days ago amongst all the fallow wheat upon the farm; and I gave personal attention not only to the sowing of the seeds, but also to the harrowing process, during its whole continuance. My father, when I went to get that business executed, said to me, ‘George, remember to have the seeds well covered, otherwise an imperfect appearance of plants may be expected. I never saw a headland where the seeds did not vegetate well, owing entirely to the extra harrowing which that part of the field received; whereas, I have repeatedly seen other parts, even of the same field, imperfectly planted, from a want of sufficient harrowing.’ Prompted by these suggestions, I took care that a close double time was given to every ridge; and insisted that the harrows should be driven smartly along, so as the full effects of the teeth, in loosening the surface, and covering the seeds, might be obtained. We sowed 40 acres, part with red clover and rye-grass, for soiling; and the remainder with white, red and yellow clover and rye-grass for pasturage. A greater quantity of seeds were given in the last than in the first instance.

The gentleman to whom you recommended me, undertook at once to act as arbiter in settling the several matters betwixt me and my predecessor. He seems to be perfectly up to a business of that kind; for, when I waited upon him with a copy of the submission, he immediately said, that, with the gentleman appointed on the other side, he would undertake to determine the respective claims in four or five hours. Surprised at this rapid mode of procedure, and knowing of some submissions which had been carried on *de die in diem*, I ventured to hint, that longer time might be necessary, to do justice to the parties. ‘Oh,’ said he, in an easy way, ‘I can readily explain the cause of the delay which you allude to. Those who were acting did not know the business entrusted to their decision, and of course halted at every step. People acquainted with such matters get more cleverly forward, especially if they have been often employed. In short, I pledge myself that a decret shall be pronounced, at one sitting, upon every article in the submission shown me. Nay, I tell you plainly and candidly, that I have been engaged in more complicated submissions than yours, and spent less time in discussing them than what I have mentioned.’ Believe me, had not the gentleman been of your recommendation, I should have felt some apprehensions about the issue of the submission; but recommended by you, every apprehension vanishes.

May 3.—The turnip break is cross-ploughed, and will next week be harrowed, rolled, reharrowed and hand gathered; after which, the person employed will give it a third furrow; in which state it must remain

till I enter to possession of the farm. I have talked to him about cross-ploughing the plain fallow, and offered 14s. per acre if he would plough it nine inches deep. He does not seem averse to the offer, provided he can get on with his own business, which, he alleges, has rather fallen behind during the time he has been engaged with the turnip land. If he declines, I shall look out for some other person, being sensible of the great importance of stirring the fallows at an early period. The dung on the farm appearing to be imperfectly made, I proposed to my predecessor to have it removed from the courtine, or farm-yard, so as it may be properly piled up and mixed together; and offered to provide fillers, if he will furnish horses and carts. In fact, a removal is for both our interests. To him it must prove beneficial, because the dung cannot be accurately measured in its present situation: and to me the removal must be advantageous, because, without it, the dung can neither be properly rotted nor fermented. He has agreed to the proposal; and the removal is to commence on Monday, when all hands will be employed.

May 27.--I have now entered to possession of the farm; that is to say, to the grass and fallow land, and the dwelling-house, cottages and stables. My situation, at present, is certainly not a comfortable one; but in a few weeks, I hope matters will be suitably arranged. I purchased four horses at some rousps in the neighbourhood, and entered them this day to harrowing the turnip break, so as it might be prepared for a fourth furrow. I mean to set out for Glasgow fair to-morrow,

to purchase six other horses ; and next week the submission betwixt my predecessor and me is to be discussed. You therefore see that I shall not be idle for some time. My father and another friend mean to accompany me to Glasgow ; and after our return, you shall hear from me. Indeed, I have already received so much benefit from your instructions, that I would be callous to my own interest, were I to neglect any opportunity of seeking information at a source whence the ignorant may always be supplied without fee or reward.

June 3.—Upon my return from Glasgow market, where I had gone with my father and another friend to purchase horses, I was happy to find a letter from you on my table;—more so, as the contents showed that you still retain the same partiality and kindness in my favour, as the tenor of your behaviour, since I had the good luck of being committed to your superintendance and management, had constantly evidenced. Allow me, my dear Sir, to thank you sincerely for so many kind and affectionate advices. I shall treasure them up in my mind, and endeavour to exemplify the force of them in my daily conduct. Prudence and integrity are certainly qualities of the first importance. These qualities you warmly recommend, as tending to compensate for many imperfections. Though I may be too young to have full possession of the first, yet I hope the last has never been disregarded. Indeed, upon these two qualities, the real character of every man depends. Without the first, he is a fool;—without the latter, he *may* be a rogue;—but, guided by both

qualities, his actions must necessarily tend to promote his own happiness and the welfare of society.

But to come to rural matters.--I am highly gratified by the approbation you are pleased to bestow upon the rotations of cropping submitted to your consideration in one of my former letters. In particular, I am well pleased that my father's observations concerning the increased and increasing benefits from grass-husbandry, are thought worthy of so much commendation. He has been a kind parent all along,--therefore merits from me not only profound respect, but also implicit obedience on all occasions. You justly remark, that the advantages of grass husbandry will increase in direct proportion with the prosperity of the country, because the general taste of mankind is in favour of the use of butcher meat. This, my father says, is a sound remark, being justified by the experience of many years. He adds, when he commenced farming, that a beast or two, of thirty stones each, with a few half fed sheep, fully supplied the weekly demand of the neighbouring borough; but that now, when the wealth of the country is so greatly increased, twenty or thirty beasts, and these of greater weights, with a considerable number of well fed sheep, are required to supply the consumpt of the inhabitants for the like period. Indeed, should the wealth of the country increase to such an extent as to allow the lower ranks one meal of butcher meat per day, there is no saying to what length grass-husbandry may be carried. In my humble opinion, however, it should always be connected with corn-husbandry, and never exercised in an

exclusive way, as customary in many parts of the neighbouring kingdom.

We purchased six good horses at Glasgow market, none of them above six years of age, the average price of which amounted to fifty-five guineas or thereby. In point of expence, a good horse may be as cheap, if not cheaper maintained, than a bad one; therefore, the work of the good horse being of much greater value, it is for the interest of every farmer that the working stock should be fresh, strong, and capable of performing the labour for which they are intended. If horses are weak and feeble, work, ploughing especially, cannot be suitably executed; of course, either less ground is turned over, or a shallower furrow taken, which is almost the greatest evil which can befall an arable farmer. Indeed, if a weak horse requires as much corn and hay as a good one, common sense inculcates the utility of providing animals of the best quality. My father has always been very particular in these matters; and, I trust, has furnished me with a stock of horses capable of executing every branch of rural labour in the most advantageous manner.

The submission betwixt my predecessor and me has been signed this day; and the arbiters are to proceed in discussing it to-morrow. They have chosen an oversman and a clerk, and summoned six witnesses, actual tradesmen, whom they mean to examine with regard to the condition of the houses and fences. I understand this is their usual mode of proceeding; and must acknowledge it seems well calculated to expiscate

the truth. In that way, they have the whole benefit of the tradesmen's experience, without delegating any part of the power with which they are entrusted. In short, arbiters acting in this manner, may examine as many witnesses as they please, with regard to any particular fact or circumstance submitted to them; while the power of determining or judging upon the weight of the evidence, is still reserved in their own hands. I now begin to discern, that the gentleman to whom you recommended me was not wrong in affirming, that many arbitrations were kept up and delayed, because those employed did not know how to carry them into execution; and shall in my next fully explain the proceedings of the gentlemen appointed to judge of the various matters betwixt my predecessor and me. I expect my father this evening; and shall leave the agency of my claims solely to his guidance and discretion.

June 12.—Since the meeting of our arbiters, I have been so busily employed, as not to find leisure for transmitting, at an earlier period, a detailed account of their proceedings. Such an account may be useless to you, who have so often been employed as an arbiter; but I am sure it will be agreeable to learn, that the whole business was speedily finished; and, what is better, that it was finished to the satisfaction of the parties.

When the arbiters and oversman met, I was called as incoming tenant, before them, and desired to state my claims against the outgoing tenant. My father,

from a written paper in his hand, then stated the claims, namely, repairs of houses and fences; and expressed his desire that it should be formally ascertained, whether the full quantity of grass land and summer fallow was left upon the farm, and whether the clauses which respected management and cropping had been regularly implemented. The arbiters then called for my predecessor, and read over to him what had been urged by my father in behalf of the incoming tenant. To this it was replied by my predecessor, that he believed some repairs were necessary upon the houses and fences, the value of which repairs he was willing to pay; and that, with regard to the other prestations upon him, they were faithfully implemented. Moreover, he stated his claims against me, as incoming tenant, for the value of the land uncropped this season; of the ploughing given to it; and of the whole dung upon the premises. A minute of these matters having been made, the witnesses summoned were directed to examine the houses, and ascertain whether they were in the state and condition prescribed by the lease. Immediately thereafter, the arbiters and oversman inspected the fences, marking in writing, as they went along, the deficiencies which appeared. They then desired the outgoing tenant to lead a proof that the farm was cropped, for *three years baék*, according to the rules of the lease; which he having done to their satisfaction, the witnesses sent to examine the houses were called; and being interrogated upon oath, deponed respecting the repairs that were required. The dunghills were afterwards measured; and, before dinner, a decret-arbitral was scrolled, and ordered to be

engrossed upon stamp-paper. The substance of which is as follows.

The arbiters and oversman find, that the sum of forty-five pounds thirteen shillings and eightpence Sterling will be required to put the houses upon the farm of — in the condition prescribed by the lease. Find, that the sum of eighty-three pounds nine shillings and threepence Sterling will be required to put the fences and gates upon the said farm in the like condition; which sums, amounting to one hundred and twenty-nine pounds two shillings and elevenpence Sterling, they decern and ordain to be paid by the outgoing to the incoming tenant, at Lammas first to come, with legal interest from that date, in case of non-payment. Find it established, that the full quantity of grass land and summer-fallow, mentioned in the tack, has been left upon the farm; and also, that the said farm has been managed and cropped, according to the rules and obligations of the tack; therefore, decern accordingly. Find, that the value of the land left uncropped this year as a turnip or fallow-break, at the rate of three pounds ten shillings per acre, is one hundred and seventy-five pounds; which sum, they decern and ordain to be paid by the incoming to the outgoing tenant, at Whitsunday next, with interest from that date, in case of non-payment. Find the value of one furrow given to the said fallow to be twelve shillings per acre; and that the amount of the same is thirty pounds Sterling. Find, that the quantity of dung left upon the farm, and produced from the penult crop, is nine hundred and forty cubic yards; but, in respect the out-

going tenant could not reap more than one year's benefit from that dung, find him only entitled to be paid for it as a cottar. Find, therefore, the value of the dung, at the rate of two shillings and sixpence per cubic yard, to be one hundred and seventeen pounds ten shillings; which two sums of thirty pounds and one hundred and seventeen pounds ten shillings, amounting, in all, to one hundred and forty seven pounds ten shillings Sterling, they decern and ordain to be paid by the incoming to the outgoing tenant, at the term of Lammas next, with interest from that date; in case of non-payment, &c. &c.

Thus, a business is settled, which gave me at first some uneasiness. The whole expenses thereof amounted exactly to ten guineas, the arbiters having declined receiving any payment for their trouble. They ordered six guineas to be paid to the gentleman who acted as their clerk, for stamps, and writing the submission and award; one guinea to a landmeasurer who ascertained the quantity of dung; and half-a-guinea each to six tradesmen summoned as assessors; which sums were paid by my predecessor and me in equal proportions. After business was despatched, the arbiters and overseeman did me the favour of taking a share of dinner alongst with my father and the outgoing tenant, together with the clerk and landmeasurer. I find the latter to be a decent and discreet man, an excellent figurer, and one who understands mensuration in all its parts. On these accounts I mean to give him all the countenance and employment in my power. We spent the afternoon agreeably, and did not forget to drink your health. My predecessor behaved very hand-

somely through the whole arrangement. In short, without showing the least ill-will or spite to me, because I am his successor, he has, from first to last, acted like a gentleman, and as one who knows the world. He has never ostentatiously professed to serve me; but, on the other hand, has as seldom thrown cold water on any part of my proceedings. I am so much satisfied that good agreement betwixt outgoing and incoming tenants is for their mutual advantage, that I mean to meet him more than half-way in every matter which may occur, till his crop is harvested and marketed. In these processes, it is in my power to serve him materially.

The turnip field is now ready for sowing, having received five ploughings, the last across, (which my father strenuously recommended as the best method preparatory to forming the drills), with repeated harrowings and rollings. It is perfectly clean, and completely pulverized; but I am afraid that brairding sap may be scanty, from the severe drought which has for some weeks prevailed. I should have mentioned that one fourth of the field was sown last week with ruta бага and yellow turnips, having, *per* favour of my predecessor, obtained as much dung as was required to supply that part of the field, though the arbiters had neither valued nor measured it. The number of cart loads drove out were ascertained; and it was agreed that each cart load should be considered as containing one and three quarter cubic yards, and paid for accordingly. This is one instance of the benefit which may be done by an outgoing to an incoming tenant;

for, assuredly, had my predecessor drawn cross, I could not have got either ruta бага or yellow turnips sown in proper season. My father is a great advocate for yellow turnips, saying, they possess all the qualities of ruta бага, and are much easier produced. He seems to think, that a full crop of ruta бага can only be obtained from ground, either naturally of very fine quality, or which has received a large supply of dung. The advantages of ruta бага are, resistance to the severest frost, and supplying food for cattle and sheep, after common turnips are consumed, and till the grass season arrives. Similar advantages, my father says, may be procured from yellow turnips upon inferior soils, and with less expenditure of manure. These matters, I hope, ere long, to be able to speak upon from practical experience.

Though the utmost care has been taken to feed the horses well, and not to push them too fast, I find those bought at Glasgow are rather getting into a backward state, being duller in the eye, drier on the skin, and not feeling so plump and mellow as when they were purchased. The horses bought at country rouns have not fallen off in the least, though equal work and treatment has been given the whole stock. Shall I attribute the difference of condition to the west country horses not being formerly kept upon the same sort of food as given to them here; or must I suppose that at home they were gently worked, and not used to nine hours per day in plough and harrow, as has regularly been the case (Sundays excepted) since they were purchased? Each of them has got nearly one

third of a firloft, or twenty-one pounds weight, of good potatoe oats, and one and a half Scots stones, or thirty-three pounds weight, avoirdupois, of hay every day since they came into my custody. I purchased the oats at 28s. per boll, and the hay at one shilling per stone; so, of course, the expense of their maintenance has not been less than four shillings per horse per day. I have now begun to give them cutting grass instead of hay, though I do not think it would be prudent to withdraw any part of the corn till the sowing of turnips is concluded.

My establishment (perhaps the term is an improper one, when applied to the servants of a farmer, though used in a pamphlet lately published) consists of my sister, who has kindly undertaken to manage the house till a better manager can be procured, a maid-servant, and a boy to clean my saddle-horse, and perform odd jobs. The ploughmen and labourers are married men; and all of them have behaved steadily and decently since they entered to my service. They leave the stable at five o'clock in the morning, and it generally is half-past ten o'clock before they return; as my orders, like yours, are, that the yoking is to commence when they put the plough in motion, not when they go out of the stable-doors. In the afternoon, they leave the stable about twenty minutes before two o'clock, and go four hours after the plough is set to work. Now, when the horses receive grass, the ploughmen have to bring it from the field betwixt yokings, it being cut and tied in bunches by one of the labourers, which, as you often told me, are most saving operations. In fact,

where such management is neglected, a great waste and an irregular supply are the necessary concomitants, though, where attended to, the horses are supplied in a regular and economical manner.

June 17th.—The sowing of turnips is now finished, and fine dry weather was enjoyed during the whole of the process. I could not, like you, carry on the forming of drills, dunging the ground, splitting the drills, and running the seed-machine, all at one time; but I did the best in my power which circumstances would permit: I formed a considerable number of the drills beforehand, employing three carts in driving out the dung, two ploughs covering it in as fast as it was spread, while, with an odd horse, the drill machine regularly deposited the seed. I made it a point, that a single drill was not to remain uncovered at the end of the yoking, and took equal care that none were left unseeded; so I hope the best was done under the circumstances of the case. When the drills previously made had been dunged, the whole strength was employed to form additional ones; and, by acting in this way, and paying constant attention to the work while it was executing, I hope a regular braird may be procured, notwithstanding of the uncommon dry weather which has lately prevailed. I might have mentioned, that two additional labourers were engaged for filling the dung-carts, as one of my own was employed to manage the seed-machine, while the other was cutting grass, and at other jobs. The dung was spread by five boys, who, after the first day, did it very well with light grapes, which I got made on purpose for that operation. At

first, they rather appeared to do the work imperfectly; but upon offering a premium of half a crown for the best spread drill, their attention was immediately excited, and a competition ensued, which afterwards was attended with the most beneficial consequences.

The ruta buga and yellow turnips, sown about two weeks ago, have braided pretty regularly, and must soon be scraped by the Dutch hoe. These were drilled at intervals of two feet, as the plants, not growing so large as common turnips, do not require intervals of the like size. The summer fallow is now to receive the third furrow; previous to which, I mean to harrow and roll it well. Owing to the severe drought, the ground is very dry, and will require the heavy stone-roller to reduce it sufficiently. After rolling, my intentions are to harrow again; then hand-pick all the quickens, &c. that may be brought to the surface; and these operations being over, the ploughs will be entered, and the ground ridged up as expeditiously as possible.

June 30th.—Many thanks to you for the shrewd and kind advices contained in your last. You caution me against keeping much company; alleging, justly, that great expense is not only incurred by such conduct, but that a farmer's mind is thereby abstracted from the regular management of business. On these matters, my sentiments are precisely the same with your's. Indeed, I have often wondered at seeing some of my friends so eagerly set upon giving and receiving visits, as scarcely to have a whole day for the guidance

and superintendance of their own affairs ; and have entertained doubts, whether such persons were influenced by the enjoyments of the table, or the pleasures of society, to imitate the higher ranks, who, having little or no real business to occupy their attention, are necessarily influenced to devote the greatest part of their time to the enjoyment of social life. The man of business, however, is differently circumstanced. With him every moment is precious. If he spends time in idleness, his private affairs must suffer. His income depends, in a great degree, upon his own exertions ; and, if these are weak, irregular, or misapplied, his resources must proportionably be dried up and lessened. Let any man reflect, whether, after spending one half of the day and a part of the night in company (a custom now too prevalent), a farmer can have the same disposition for business in the morning, as if the preceding day had been spent in following the duties of his profession, and the night in refreshing his body by rest and sleep. Surely he cannot ;—and, if so, his business must, in one way or other, be thereby injured. Besides, the racket of company is inconsistent with the domestic economy of a farmer's house. It occasions his family to be neglected ; throws his household affairs into confusion ; takes his servants out of their proper sphere ; adds greatly to his expenditure ; and, in short, places him in a situation inconsistent with the real welfare and happiness of those engaged in the rural profession.

Mistake me not, by supposing I am hostile to social enjoyments ; nor think me so cynical as to condemn

every relaxation, as a departure from the rules of regularity and business. No person likes better to see a few friends than I do; and, short as the time is that I have kept house, most of my parochial neighbours have already taken a share of dinner with me. It is not the moderate enjoyment, but the abuse of social pleasures, against which I contend;—where visiting is regarded as the chief business;—where eating and drinking is considered as the *summum bonum*,—and where the principal care of one day is the dinner of the next. Surely I am right in reprobating and condemning such preposterous conduct. Indeed, my sentiments concerning these things were learned at your house. When under your charge, I noticed that the pleasures of society were not disregarded, though, to your praise be it said, the cup was never emptied to the last dreg. Your entertainments were arranged in such a way as not to interfere with professional duties; particularly, I must remark, that, in seed time and harvest, you seldom considered the visits of your friends as a relaxation from business. Nay, if I am not mistaken, you one day declared, that a ticket, at these periods, should be affixed upon every farmer's gate, containing these words, "No admission here." According to your system shall my conduct be squared. I will see my friends with pleasure at convenient periods, and repay their visits in the same way, without considering the business of so much importance as to keep a debtor and creditor account of it. I will constantly endeavour to preserve regular hours; and, above all, avoid the absurd practice recently introduced, of dining at the same hour as the ancient Romans supped. Common sense declares early hours to

be best for those engaged in the rural profession. The attentive and diligent farmer will rise equally early with his servants, at least, for a considerable part of the year; but early rising and late upsitting are at utter variance. In short, it is my firm resolution, never to sacrifice the duties of one day for the pleasures of another. Having once got into the right road, perseverance will only be required to preserve me from wandering out of it. At my time of life, sedulity and attention to business ought by no means to be disregarded; as inattention to these qualities may engender habits afterwards not easily overturned.

The turnips have not vegetated so regularly as might be wished, though I am inclined to think the plants are sufficiently numerous to make a crop. The ruta бага and yellows are set out, and once horse-hoed. These crops are thriving and regular; and, being the first that I have cultivated on my own account, the sight of them affords me great satisfaction. The fallows are all ridged up, and seem tolerably clean. I am now driving lime for one field which does not seem to have received calcareous matter for many years. I find that, for prime cost and carriage, the expense of liming will not be less than ten pounds Sterling per Scots acre.

July 28.—I took your advice, and shut up the grass fields for a month after my entry to the farm, as they were completely eaten up by the bestial of my predecessor before his departure. For the first twenty days little difference of growth appeared; which inclines me to think, that the eating of grass land, in the spring

quarter, when the weather is cold and blasty, is highly pernicious and destructive. About the end of the month, however, some soft genial rains having fallen, the fields assumed a fine verdure; and a full bite was shortly after obtained. My father sent me half a score of highland cattle, and recommended, that I should attend some of the neighbouring markets, and endeavour to purchase such further stock as might be wanted. Accordingly, I attended the fair at ——— and having pitched upon eight decent three-year old country stots, which might be partly fed in summer, and completed upon turnip in winter, I ventured to request the opinion of a celebrated and well known grazier, concerning their value. His reply mortified me exceedingly, especially as it was delivered so audibly, that one half of the market might have heard it. ‘What,’ cried he aloud, ‘does the apprentice of the great Mr Jamieson stand in need of the advice of a hobbledehoy like me! Go back to Barnhill, and complete your apprenticeship.’ Touched to the quick by such a sarcastic reply, I turned about, and left the *gentleman*; and, though dubious of possessing sufficient skill, ventured to conclude the purchase upon the lowest terms that could be made with the seller. Since that time, my father has been here, and assures me that the bargain is a very decent one; which is satisfactory information.

The working horses remain in middling condition, notwithstanding they have been twice each day fed with oats since the turnip sowing was finished. The clover grass is rather getting coarse, which is much against them, and in all appearance it will be fully three

weeks before the second crop is ready for the scythe. I feel the want of tares—an article of horse food indispensably necessary at this period of the year; but, next season, shall take care to provide an abundant supply. Where tares are neglected, the deficiency may be made up, by pasturing a piece of the clover field for ten or twelve days, at Whitsunday or the first of June; in which way fresh grass may be obtained, at the time when tares are required. A farmer in the neighbourhood followed the plan mentioned; and, at this time, has soft young grass for his horses, whilst mine is hard, coarse, and unpalatable. The seasoned horses purchased in the neighbourhood have all along kept in better condition than those brought from the west country.

One of the fallow fields of the thin clay soil, has received dung, and was ploughed thereafter as expeditiously as possible. This field contains 14 Scots acres, to which 168 carts of dung were applied, and seems to be in excellent condition. I have cleared out the headland and *gau* furrows, in case the usual Lammass flood shall follow; and, if weeds do not appear, mean to sow it with wheat in the first week of September if possible. Should it take on the slightest growth before that period, I will give another ploughing; though, being well rounded up, I would rather wish to sow it upon the present ridge. The other fallow fields are to be dunged immediately. Respecting this branch of work, the injunctions of my father are very particular. He repeatedly told me when here—‘Take out your dung to the fallows about the first of August, or thereby, if practicable; draw it equally out of the cart, and spread it

without delay. Plough the land without loss of time after the dung is applied, taking care that an equal furrow is given to every part of it, and by no means neglect to spade and shovel the head land and cross furrows, even though the weather at the time be steadily dry; as a heavy loss, at least a great inconvenience, is often sustained, from a want of attention to these seemingly trifling matters.' With the assistance of the stable dung made through summer, I believe we shall be able to manure the whole of the fallow. You may likely think that the summer dung will not, at this time, be ripe for use; but I have the authority of the celebrated Mr Professor Davy for using *long* dung, which may save me from censure, when acting contrary to the established practice.

August 5.—I am favoured, my dear Sir, with your obliging letter of 2d instant, which adds to the numerous obligations already conferred upon me. You hint the propriety of seeking after a regular housekeeper, now when I am fairly settled in the farm; and forcibly urge the manifest advantages of the matrimonial state to every man possessed of a house, and capable of supporting a wife and family in a suitable manner. Though I have not the slightest cause of dissatisfaction with my sister, who enters into all my views with spirit and alacrity, yet it must be confessed, that I have some thoughts of giving her an opportunity of returning to my father and mother. As you justly observe, no woman whatsoever can manage a man's household affairs with the like frugality as she with whom he is legally connected for life. When called from home, he can with confi-

dence reflect that his house is under the management of one who is equally interested with himself in its prosperity ; and he may be satisfied, that though all the rest of mankind forget him, there is still one individual who thinks of him with pleasure, and looks for his return with heartfelt anxiety. You also remark, that many unmarried farmers have been plundered by those to whom their household affairs were entrusted ; and quote several instances, some of which are not unknown to me, of persons so circumstanced being thereby brought to the gates of ruin. Your advices have therefore made a deep impression, and probably may occasion a disclosure of my sentiments at an earlier period than once intended. I refrain from saying more at this time on such an important subject, fondly hoping, when my sentiments are disclosed, that they will not be disagreeable to you.

I mentioned, in my last, that the fallow field of thin clay soil was dunged, and seed-furrowed for wheat ; and can now acquaint you, that the whole fallows have received dung, and that we are busily engaged in ploughing it down, an operation undoubtedly of great importance. The dung, as measured in June last, when the arbiters settled matters betwixt my predecessor and me, was reported to consist of 960 cubic yards, which, according to the common understanding, ought to have loaded 640 double carts. I found, however, that it was taken out by 548 carts, which was nearly at the rate of one cubic yard and three quarters per cart. As fifty cart-loads of decent dung were made by soiling through the summer, the quantity applied to the turnip and fal-

low land appears to be nearly twelve carts per acre on an average. The greatest part of the dung, however, was so well rotted, that my father assures me the land is sufficiently manured. He seems hostile to an overdose; alleging, that such is as detrimental to the soil as a surfeit of food is to the human body. I took particular care to have it well spread, having learned, when under your inspection, the great benefit arising from separating the parts in the most minute manner.

As the dwelling-house needed some repairs, I have lately gutted a part of it, and made a new room, twenty feet by sixteen, which will enable me to receive my friends, with comfort to them, and satisfaction to myself. When you come over, we will *heat* the room, at which time my father promises to see me. You and he have been intimate for such a length of time, that a meeting cannot fail on both sides to be highly agreeable.

August 30.—The crops on this farm are not amiss; and a part of the wheat is already cut. My predecessor has taken a house in the neighbourhood, so as he may be at hand to superintend his harvest-work; and, having an overseer to look after the reapers, is not by any means confined to the field. The cutting is not so good as I could wish; there being, in my opinion, not less than fifty stones of straw left upon each acre of wheat, which, of course, will lessen the quantity of the dung on the farm next year considerably. I have heard it remarked, that fifty stones of straw will make two cubic yards of dung, if properly manufactured; so the loss, by this high cutting, will not be a trifling one.

Many proprietors are careful that the land, in the last year of a lease, should be regularly cropped; and so far they are in the right:—but none of them, to my knowledge, have ever prescribed any regulation, or interfered in the slightest manner concerning the cutting of that crop, though a great and serious injury is evidently sustained by the new tenant, when the crop is cut in a slovenly or imperfect manner. I spoke to my predecessor on that subject; but he replied, that his interest went no further than cutting the whole corn, and, so far, he would take care of the reaping; but, as for cutting by the ground, which would add five shillings per acre to the expence, that was no part of his business. As matters stand, I believe he is in the right; therefore think, without a special clause in leases, such an abuse stands a chance of being continued, notwithstanding of its injurious consequences to the cause of agriculture.

The fallow fields being all seed furrowed, I have set the carts to driving lime for one of the clover fields, and expect to finish it before seed-work commences. I am still giving the horses one feed, or six avoirdupois pounds, of oats per day, finding it impracticable to carry on work in a business like manner without that assistance. Since my entry at Whitsunday, the ten working horses have consumed forty eight bolls of oats. The first five weeks, they were fed three times a day; the next four weeks, twice a day; and afterwards received only one feed. I paid, on an average, twenty-seven shillings per boll for the oats, which amounted to sixty four pounds sixteen shillings. This, to be

sure, is a heavy charge; but, without bearing it, I must either have run down my stock, or executed the summer-work of the farm imperfectly. Under this expenditure, I have turnipped and summer-fallowed fifty acres of land in a satisfactory manner, besides driving a considerable quantity of lime; therefore, do not grudge the expence which has been incurred.

The grass land did very well, having been saved till a full bite was obtained. This mode of management is undoubtedly most commendable,—serving to cover the surface, and thereby to benefit the soil, whilst, at the same time, it is the best way of bringing forward bestial thereupon depastured. The ten Highland cattle received from my father are already sold; and the country beasts purchased at the markets are in a thriving condition. I have thoughts of disposing of them to some of the turnip feeders, considering that my twelve acres of turnips and ruta-baga will be better appropriated to the support of winter ewes and cattle, than to the feeding of these beasts. I purchased, at different times, a score of country cattle; and suppose, at Michaelmas, that, one with another, they may yield a profit of three pounds per head, having constantly had a full supply of food.

Till last week, I had not the slightest dispute with any of the servants; but an altercation then ensued, which required a strong measure to be used without delay. One of the ploughmen, whose physiognomy displayed evidence of a sulky temper, was beating his

horses with the plough-staff when I came upon the field. He desisted from such barbarous usage upon getting a sight of me; but, being resolved to check the first appearance of a practice which cannot be too severely censured, I went up to him, and calmly inquired why he presumed to beat my horses in that manner? He insolently replied, that he would thrash any man's horses, even those of the King himself, were they not obedient to his orders. Will you do so, my good fellow?—Then I must tell you, that you are not to remain in my service a moment longer. Unyoke the horses, and take them to the stable. That I will, says he; but I hope you will pay me my wages. Yes, for the time you have served me, provided you instantly leave the place, with bag and baggage. I gave the horses to one of the labourers for a day or two, till another ploughman was engaged; and I am almost certain, that the example made will be attended with beneficial consequences, as the fellow hitherto has not procured any employment. Indeed, when the purchase and keep of horses is so great, no man whatsoever ought to receive employment as a ploughman who uses these animals in an improper manner.

September 12.—The fallowed field of thin clay soil, containing fourteen Scottish acres, was sown a few days ago with ten bolls of excellent wheat, purchased, according to your recommendation, from the celebrated Mr Hunter,—a gentleman who, perhaps, has paid more attention to the breeding of seed-wheat than any other agriculturist in the island. The pickling process, upon which, you always told me, much depended, was con-

ducted with the greatest attention. I previously provided a considerable quantity of stale urine, and hot limeshells fresh from the kiln. After wetting the grain completely with the urine, we riddled so much newly slacked lime upon it as to dry up the moisture. Then, turning the heap, and mixing the whole sufficiently, the grain was put into two carts and carried to the field, where it was sown with the utmost expedition. We entered early in the morning to work, and finished the field without unyoking the horses. The fourteen acres took twelve hours work of ten horses to give a double time of the harrows in length, a double time across, and a single time in length as a finisher. The field was also water-furrowed before we left it; and I fed both men and horses upon the ground, otherwise it would have been impracticable to have got through more than two-thirds of the work which was executed. Next day, the whole headland and *garw*-furrows were spaded and shovelled; and it was well that these operations were speedily performed, as, yesterday, a great deal of rain fell, and put the ground into such a condition, that I suppose neither ploughs nor harrows can be yoked for several days.

My predecessor had got up six stacks of wheat and two of potatoe oats before the rain fell; but when he will get more into the yard, is a problematical circumstance. I gave him two days of my carts, and am resolved to assist him, so far as in my power, till the whole crop is harvested. None of the stacks were covered when the rain arrived, though he immediately

set about that necessary operation, which, to say no more, can never be well executed, except when the weather is calm and dry. A waygoing tenant is certainly exposed to many inconveniencies when harvesting his last crop. He is rarely on the spot himself, and seldom provided with the best set of hands for performing the several branches of harvest work. To cover a stack in a neat and sufficient manner, requires a servant of more than ordinary abilities; and it is hardly to be expected that such will be found amongst the common tribe of harvest workers. In short, the evil can only be remedied by stipulating, in the lease, that the waygoing crop is to be taken at a fair valuation by the landlord, who, of course, when he sets the farm, will transfer the obligation to the incoming tenant.

Here, I am aware, it may be objected, that a burden would be thrown upon the landlord, or the person who stood in his shoes, and that the advantage would be entirely on the side of the waygoing tenant. To this, it may be answered, that neither loss on the one side, nor advantage on the other, could possibly happen, were such valuations conducted upon proper principles. Hitherto, to take corn upon valuation, has constantly been not only a troublesome, but also a losing business. But these circumstances proceeded from no allowance being ever made for trouble and risk, and very often from valuing a whole crop at the average price—a rate of price never obtained on the best of farms. It is plain, that the man who undertakes the trouble of managing the harvest operations of a farm, is entitled to an allowance on that account,

and likewise to a certain *per centage* for risk, &c. otherwise he must necessarily be a loser when the business is winded up. Notwithstanding it is quite fair that such allowances should be made, I never heard of the slightest notice being taken of them when a corn crop was valued. The arbiters value the whole crop upon the ground, and, when the straw is not steelbow, usually allow it for the expences of harvesting, thrashing, and marketing; which allowance is certainly far below the mark, when the enormous trouble of harvesting a crop, and the risks run before it is converted into money, are fairly considered; but even in instances where harvesting, thrashing, and marketing, have been suitably estimated, the smallest allowance has not been granted for trouble and risk, though, perhaps, the farmer, who, in these respects, occupies the shoes of another person, would not be overpaid were ten shillings *per acre* decerned to him on these accounts.

I have got in six score of ewes for wintering upon the farm. They are got at this early period with a view of putting them in good condition before the tups are admitted; and this, it is proposed, shall not take place sooner than five weeks from this date, so as lambs may be obtained about the end of March. These ewes are of a mixed breed—a dash of the Northumberland with the Cheviot, and promise, with Leceister tups, to produce lambs of good size and quality for the butcher. I am giving them a clover stubble at this time, and intend to allow a wider range afterwards. Very probably they will be removed into one of the old pasture fields about the end of January, when the clover

stubbles are ploughed, where they will receive turnips, and remain till the lambing season. I mean to give them young grass, as being the alone best method of feeding good lambs, though very likely turnips and ruta бага may be continued so long as these crops are unconsumed, there being no other way of making the young grasses carry on a stock in April and May, adequate to what they are capable of supporting through the summer season. My father strenuously recommends the ewe and lamb trade to me; and maintains, that no other mode of consuming grass can pay the the farmer so handsomely, so long as existing circumstances continue.

October 6.—The wet weather mentioned in my last continued for eight days, and occasioned a considerable expense to my predecessor, who had sixty or seventy people to maintain, without obtaining any work of the slightest consequence from them. Repeatedly, betwixt showers, the reapers were taken to the field, and as often returned, after perhaps working for an hour, and being drenched to the skin; which, of course, occasioned a great loss to both parties. He took considerable care to keep the cut corn upon its foot, which undoubtedly was an useful measure. I observe some of it, however, to be sprouted, especially the head sheaves; indeed, no care can prevent a circumstance of that kind from occurring, when such a length of adverse weather prevails. The weather settled about the twentieth of the month, when some fine equinoctial gales came on. A day or two passed before any thing could be done with the cut corn; but the moment it was dried externally, my pre-

decessor set his whole reapers to opening the sheaves, and very soon got a considerable quantity ready for the stack. As all my carts were at his command, the fields were soon cleared ; and the weather continuing good, the remainder of his crop was afterwards cut, and in due time safely deposited in the stack-yard.

The whole of his stacks are now completely covered, and the yard makes a very decent figure as to size, notwithstanding of the high cut which most of the crop received. At the same time, I am sensible that, had he cut as you do, seven or eight stacks more might have been put up. However, this loss must be submitted to ; though next year, I hope, the crop shall be cut in a very different manner. I am happy, however, to see so much bulk, when the work was so imperfectly executed.

The remainder of the summer fallow was yesterday sown with wheat, part of which I purchased from my predecessor ; and as it seems to be of a different kind from the one you recommended, I will have an opportunity of judging next year of the merits of both respectively. I noticed, however, when it was in ear this summer, that a vast number of *black* heads, something like what often appears amongst barley, were amongst it. Perhaps one ear in ten was in this imperfect, or rather useless state ; and, of course, I apprehend this variety will be comparatively unproductive. It shows, however, a good sample, seems to yield more straw than any other, and probably may make up, in these respects, what it apparently wants in others.

I have sold the country beasts purchased at the summer markets, and have netted exactly three pounds ten shillings upon each beast, which you will allow is a very decent profit, to speak in the language of Northumberland. I am going to Falkirk in a few days to purchase thirty Fife stots, if they can be got, thinking them to be the best sort for wintering in the straw-yard, receiving a few turnips and ruta бага in March, April and May, and soiling afterwards. I know you always recommend beasts for soiling to be in good condition before the grass season; therefore trust my plan will meet with your approbation. If you are at Falkirk, I will be happy to receive your advice and assistance.

October 28.—Wheat seed is now finished with me for this season, having sown altogether sixty-eight acres, viz. thirty-eight acres upon land that had been summer-fallowed, and thirty acres that had carried peas and beans to my predecessor. I had an intention of trying ten or twelve acres of clover stubble; but, after hearing my father's opinion upon that point, gave up all thoughts of attempting wheat thereupon, as he thinks oats to be a more certain, and, at all events, as valuable a crop. He urges, that clover stubbles seeded with wheat are constantly in bad condition after the crop is reaped; whereas, when seeded with oats, a good crop may not only be expected, but, what is of greater importance, the ground will always be found in order for carrying peas and beans as a preparatory crop for wheat. These reasons induced me to change the resolution originally formed, though I mean to sow with wheat in the spring all the land cleared of turnips before the

first of March. I will, however, sow our usual autumn wheat, having no favour for the new kind of spring or summer wheat so keenly recommended by that respectable gentleman, Sir John Sinclair, Baronet. I am satisfied our climate does not suit that variety. It may do in Sicily or Egypt, but will not answer in this country. From a conversation the other day, with that excellent and assiduous agriculturist, John Christian Cuwen, Esquire, President of the Workington Agricultural Society, I noticed, with pleasure, that his sentiments, respecting spring or summer wheat, are precisely the same with what I have formed on the subject. Mr Curwen has tried this newly introduced variety to a great extent; therefore is a competent judge upon its utility. In fact, the variety seems to be recommended as a *succedaneum* for barley after turnips, now when the culture of that valuable grain—valuable certainly upon light soils—is discountenanced by the legislature of the country.

I was sorry that you was not at Falkirk, as expected. I purchased there thirty very good Fife three-year-old stots, which probably may feed to forty stones Amsterdam, or thereby. I intend, after the stubbles are ranged, to give them straw till the middle of February or so; after which, they shall receive a tasting of turnips and ruta бага. Of my twelve acres of these roots, I am almost sure that six acres will fully supply the ewes; therefore, the remainder will be of great advantage to the cattle. I shall take care to proportion the quantity in such a way, as that the ruta бага may last

to the first of June, when cutting grass is to be expected.

Since wheat seed was finished, I have entered upon the fields intended next year for turnips and ruta бага, giving them a deep furrow, in imitation of your practice. I mean, next, to plough the bean land, though I am not resolved whether to give a cross furrow, or to gather up the ridge. Could a good spring season be depended upon, I would adopt the last method, and give the cross furrow previous to the seed one. Perhaps it may be best to try both ways, as, by acting in this manner, there is a chance of being more successful than by exclusively adopting either the one or the other mode.

The horses are now put upon hay and corn, and are in good spirits. My predecessor speaks of not intending to thrash any of his peas and beans till after Martinmas; so I must keep to hay till that time. It is a great matter to have horses in order at this season of the year; as, if they get out of condition at the beginning of winter, it is hardly practicable to make them up for many months, with every indulgence. I mean, therefore, to be particularly attentive to their keep at this time, and next week to give up two journeys *per* day. As field labour is in an advanced state, one journey of five hours will, in my opinion, answer quite well till the spring quarter arrives.

November 25.—As the land intended for beans and peas has now got the first furrow, part in length, and

the remainder across, we have now begun with what is meant for summer fallow. I have ordered that a deep ploughing shall be given to these fallow fields, knowing, unless it is completely ripped up, that no after exertion can compensate any defect in the first instance. I have taken particular care, that the head-lands and *gaw* furrows of every field ploughed shall be sufficiently digged and cleaned out, so as a drop of water may not stand upon them during the winter months. This was an advice which you constantly inculcated; and, if I recollect right, you often said, that, at one glance, you could determine whether the general management exercised upon a clay land farm was good or bad, merely by looking at the head-land furrows.

My predecessor is busy thrashing out his crop, and rather proceeding faster than is desirable. It is foreign to my inclination to have any dispute with him, either on that or any other matter; therefore, though he could be compelled to thrash in a regular manner, I am stacking the straw in the yard, which will, at least, serve for littering in summer. It is built with care, and the stack being carried up in leets, may be expected to stand the weather without sustaining much injury.

December 15.—I have the satisfaction of acquainting you, that I got safe home from a short journey made last week; and that all things had gone on well during my eight days' absence. Indeed, my foreman appeared to have been particularly attentive to the instructions

given him at my departure; though, as the weather remained steadily dry, they were easily followed out. It is under different circumstances that absent masters suffer most. They go from home, leaving directions,—probably very proper ones at the time they were delivered, though quite irrelevant when a change of weather occurs. If such directions, therefore, are literally obeyed, much loss necessarily ensues. Hence the utility of a head-servant, of good capacity and sufficient experience;—one who can form a new plan of action upon the spur of the moment, and with precision apply it to the different people over whom he possesses a temporary government. Though the abilities of my servant were not completely tried during my short absence, still I am inclined to think them above an average. He is sober and steady—qualities of great importance; and, having got rather a better education than common, is free of prejudice, and eager to introduce every new improvement which has the appearance of being useful.

The fields intended for summer-fallow next year are nearly ploughed; and, when that work is finished, it is proposed to break up some of the old grass land. I formerly mentioned that fifty acres were in grass, of different ages, last season, all of which is meant to be ploughed for oats, except a ten acre field that is reserved for the ewes. Upon this field they are to receive turnips, either during a storm of frost and snow, or when the spring season arrives, as it will not be prudent to give them any of the young grasses till they have dropped lamb. As yet, I have only lost two ewes, which, I presume, out of six score, does not exceed an

average loss. The remainder are in excellent condition; and, having been tupp'd about the end of October, may be expected to drop lamb in the end of March, or thereby. The cattle wintering in the yard are thriving well. Hitherto, they have got only one double cart-load of turnips per day, which, amongst thirty beasts, can only be considered as a tasting. Abundance of good straw being furnished, they have been kept in good order by that quantity of turnips; but, in a few weeks, I mean to increase it to two loads.

I have *spoken* to my servants, as it is called here; in other words, have *engaged* them for another year, upon the same terms as formerly. Upon the whole, each of them has behaved well; therefore no advantage could arise from making a change. I have not taken them bound to provide *workers*, as many people do; considering such a practice to be arbitrary and oppressive. If a servant has children capable of working, it is fully more for his interest that they should earn wages, than it is for that of the master who employs them; therefore, as voluntary work is to be preferred to that which has the appearance of being compulsory, I thought it better to make no agreement on this point, further than that those who were capable of working are to serve me in preference to any other person; it being always understood, that, for their labour, payment is to be made, according to the rates given in the neighbourhood. This regulation is so fair and reasonable, that no servant can object to it.

January 10.—A heavy snow storm came on a few days ago, and occasioned the ewes to be put upon turnips without delay. As the storm was preceded by a

week of frosty weather, due warning was thereby given to draw a quantity of turnips, sufficient for a month's consumption, and to drive them to the gate of the park where the ewes were depastured. From the *depôt* thus provided, my herd drives three cart-loads of turnips every day, which I find, from trial, to be nearly the quantity the ewes can consume. The cattle now get two cart loads per day, from a similar *depôt* in the stack-yard: and, as such storms rarely last longer than a month, I hope the quantity stored will answer till a change of weather ensues. I have provided two pairs of broad cylindrical wheels for driving turnips from the field afterwards, as the ground must be in a wet condition when the storm goes away.

To give employment to the horses, I am preparing to empty the straw yards, when the whole materials therein accumulated will be regularly mixed and prepared as dung for next year's turnip crop. I do not mean to pile up those materials in the way recommended by some people; but to drive carts upon the site of the middenstead, taking care to spread the whole in the most minute manner. Had the materials been rotted, or even imperfectly rotted, a different course would be the preferable one; but most of them are nothing but straw, hardly in a wet state, therefore could not be manufactured into dung in the fashionable way. The small quantity of dung gathered from the stables and byres shall, however, be carefully interspersed with the layers of straw, so as fermentation may follow. To hasten the process, it is proposed to cover every layer from the courtine one foot thick

with snow, which is understood to be an excellent expedient.

February 8.—The storm of frost and snow ceased last week; and is succeeded by fine genial weather. This favourable change allows the clover leas to be ploughed; and we are busy with them; though, till the end of the month, I do not mean to go more than one journey per day. I intend, as soon as possible, to ridge up the turnip land that is cleared, and have it seeded with wheat. Since the storm went away, two cart-loads of turnips have only been given to the ewes per day; which seems to be sufficient, there being a considerable quantity of old fog still upon the pasture-field. The cattle receive the same number of loads; and are evidently on the improving hand. The straw-yards were completely emptied of their contents during the storm; and two large middens were made, both of which seem to be in a forward state, throwing out a great smoke every morning, and compressing in a gradual manner. A large quantity of snow was mixed with the materials, which, I have not the least doubt, will produce an important benefit.

March 10.—Having ridged up the land cleared of turnips, it was sown yesterday with wheat of the autumn kind; having resolved, as formerly intimated, to have nothing to do with the varieties of spring or summer wheat, so anxiously patronized and recommended by the Board of Agriculture. The wheat was accompanied with grass-seeds, though some of my neighbours think, if they vegetate soon, damage may be sustained

from the April frosts. Of this I entertain no apprehension; remembering, when in your service, of the like practice being extensively followed without any disadvantage. No more than five acres of the turnips are yet removed; so, about seven acres of them and ruta бага remain for spring consumption; which, supposing the ewes to get the supply hitherto given, will fully carry on the cattle till the season of grass arrives. All the grass land is now ploughed, and to-morrow I mean to prepare the bean land for drilling. On these accounts, we are now going two journies per day, though it is difficult to make out nine hours work in the field. The day, however, is gradually lengthening, and next week there will be no difficulty in making out the full time. The weather being dry, I propose to cross-plough, in the first place, the land that was ridged up last winter. This being done, we shall harrow it; then drill it up; and, after the seed is deposited, reverse the drills, so as the seed may be covered. The success of these complicated processes depends entirely upon the weather; therefore, no time shall be lost in carrying them into execution. The other fields intended for beans, shall only get one ploughing, after being completely harrowed. They were cross-ploughed in November, and it is proposed to run the drill-barrow after the third plough. This comparative trial will serve to ascertain which of the methods is best, though, *prima facie*, it appears, the more work that can be given to land in the spring months, so much cleaner must it be for the succeeding crop of wheat, providing it is in proper condition when the work is performed.

Whenever the bean land is seeded, it is proposed to sow the oats, though, probably, part of that work may be undertaken, should the weather be such as to interrupt the processes of preparing and sowing the bean land. Some of the land ploughed from grass, will require a good deal of harrowing, especially what is of clay soil, and was ploughed after the storms of frost and snow. The horses, however, being fresh, and all in good condition, I have not the slightest doubt of getting on full as fast as any of my neighbours. Indeed, if I do not get faster on this season than other people, it would be impracticable to execute the work of the farm afterwards, without the aid of another pair of horses. I have no corn to thrash, and, of course, none to drive to market,—operations which would require one day in the week to execute; therefore, I must be either overstocked this year, or understocked the next one, if the same strength is kept in both seasons.

When mentioning the horses, I may inform you, that one of them was lately attacked with a violent inflammatory cholic, the cause of which I cannot assign, as, to my knowledge, he had got nothing but his usual food, and had performed no more than his ordinary share of labour. I ordered the farrier to bleed him in the first instance, and then to administer a dose of laudanum. As the complaints were not thereby abated, I directed injections to be given, (which were absolutely necessary, as he could not get any passage backward), and then to bathe him completely with blankets soaked amongst warm water. I sat by him the whole of the first night;

and, with the aid of a servant, endeavoured to prevent the injury often sustained from tumbling and rolling under the pain of such an agonizing trouble. Next morning the horse was not much better; and, as he steadily refused all sustenance, either of meat or drink, unless administered by the horn, the farrier gave him up. It is an old saying, that so long as there is life there is hope; so I determined every thing should be done for the relief of the horse which could be thought of. The farrier was therefore directed to back-rake him repeatedly, and to administer fresh injections. Two servants were appointed to attend constantly in the stable, and to rub him heartily about the belly whenever he stood upright. A small quantity of boiled barley was also given every hour by the horn; and some meal and warm water, in which a little nitre was mixed, were given in the like manner. Notwithstanding of the farrier's predictions, our patient showed signs of convalescence on the fourth day; and, by a continuance of care, appeared quite well in the succeeding week. I used him gently for some time, and now he is as stout and healthy as any horse in the stable.

March 30.—I have now finished the sowing of oats and beans, and am quite satisfied with the appearance of the fields after being harrowed. I had, however, to roll part of the bean land, in order to make it decent to the eye in the mean time, and fit for the horse-hoe afterwards, though I am not sure whether the crop may be benefited by such a process. I have likewise sown three acres of tares, to be cut as green food betwixt the two crops of clover, and mean to sow other two acres

acres in a fortnight, under an impression that when the second crop of clover fails (and it does fail in particular seasons, upon the very best land), it is almost impracticable to carry on the work of a farm without such a succedaneum. The oat fields, upon the whole, took on a good skin, though some of them required five double times of the harrow before they were sufficiently pulverized. They are all neatly water-furrowed, and the cross furrows are digged out with the spade.

I was careful to select oats for seed which were pure and unadulterated. Those purchased were chiefly of the potatoe variety, which, in my humble opinion, is far superior to any other, when sown upon fresh and rich soils. Ten acres of the thin clay soil are, however, sown with what is called Angus oats, thinking that field not in condition to carry a full crop of the other sort.

A few of the ewes have dropped lamb; and it being absolutely necessary that they should now be regularly attended, I have ordered the shepherd to remain the whole day, and as much of the night as possible, with them in the field. I propose next week to remove all that are lambed from the old pasture field, and to put them upon the young grasses; thinking this the best way of giving a full supply of milk to the lambs. A cart load of ruta бага shall, however, be given each night, so long as needed; though I apprehend, if the weather continues favourable, that auxiliary article may soon be withdrawn, the appearance of the young grass being very promising. I mean to allot forty acres of grass, in the first instance, for the ewes; which is one acre

of grass for three ewes. As the lambs are taken away, this quantity shall be lessened according to the season ; but, at all events, I hope it will be in my power to save ten acres for soiling in the end of July, having found last year the inconvenience of wanting green grass at that period. If I do not need it for soiling, the alternative of making it into hay remains ; and in one or other of these ways, the grass can be used with advantage.

The land intended for potatoes, ruta бага, and turnips, this year, is now getting a cross furrow, and stands much in need of a ripping up, being in many parts very full of quickens. Perhaps the fields intended for these roots may contain 35 acres, or thereby ; though as there is much foul land in the farm, nearly the like quantity will remain to be summer fallowed. I hope this arrangement will meet with your approbation, though contrary to the one originally chalked out ; which, in fact, could not be executed in the first instance. You will be so good as attend, that the whole 35 acres that are meant for turnips, &c. are of soil admirably calculated for these crops ; hence, you will recognise the propriety of extending their culture as far as possible. By doing so, the farm will be enabled to keep a large stock of cattle and sheep next season ; a circumstance of the first importance in every situation, because in no other way can a farm be so speedily and substantially enriched. Be assured, however, if the ground cannot be prepared in a husbandmanlike manner, that such a quantity of turnips shall not be cultivated. It is my wish to do every thing well, and never to attempt pushing any plan further than warranted by existing circumstances. The extent of ground proposed

to be turnipped and summer-fallowed, viz. 70 acres, certainly exceeds the work usually performed by five ploughs ; but, as I will get early at the ploughing, and am not to drive any lime this season, I do not despair of accomplishing the undertaking. At all events, I will purchase or hire additional strength, rather than suffer the radical work of cleaning the ground to be imperfectly executed. It is a material object with every incoming tenant, to put his land in order as fast as possible ; and, under the influence of this impression, I am led to make an exertion this year, which afterwards, I trust, will be altogether unnecessary. To dung the whole land proposed to be turnipped and fallowed will be impracticable ; but as grass-seeds are to be sown with the corn crop which follows, the want of manure may in some respects be compensated by additional pasturage.

April 13.—The ewes are all lambed, and for several days have been fed entirely upon the young grasses. From 116 ewes, the number that remains (four having died in winter and spring), I have 153 lambs ; most of whom are healthy and thriving. The grass fields, indeed, are good, yielding a full bite ; and, should the weather continue temperate and dry, there is every prospect of bringing the young stock to market in a month, or thereby. We had one bad night at the throngest of the lambing-time, which caused three new dropped lambs to perish ; but, if the like occurs again, I am resolved to bring the whole home to the stack-yard, where they will be completely sheltered.

At this advanced period of the season, I thought it prudent to take up the ruta бага, and get the ground thereby prepared for barley. After cutting off the tops in the field, which were given to the cattle as fast as they could use them, the roots were driven home and piled in the stack-yard. The quantity that remained loaded 105 carts; so I will be in no want of green food for the cattle till the season of cutting grass arrives; which, according to present appearances, will be about the last week of May. The cattle are in a thriving state; and, after a month's soiling, may be expected to be in condition for the butcher.

The field which carried ruta бага was prepared for barley immediately after the roots were removed. It was cross ploughed first, then harrowed and rolled, and afterwards ridged up, and sown with barley and grass-seeds. It looks tolerably well to the eye; though unless moisture is soon received, the seed must vegetate imperfectly. This is a defect which accompanies the system of feeding in April and May, not to be removed unless early storing is resorted to. I have sown the fallow wheat-fields with grass-seeds, and given them a substantial harrowing. Part of the land, where the wheat plants appeared loose at the root, were also rolled; though I know you are not an advocate for rolling land that has lain through winter under the harrowing process. The seeds were sown in the same proportions as last year. Indeed, a thick seeding seems at all times advisable.

Having now finished seed-work, I shall detail the extent of land under the several crops, &c. which at one glance will show you the system adopted for this season. The farm is not yet in shape; therefore, the mode of cropping suggested in a former letter could not at this time be precisely followed.

Wheat—after summer fallow	...	...	38 acres.
after beans	...	...	30
after turnips	...	...	5
			— 73
Barley—after turnips and ruta бага	...	...	7
Oats—after grass	...	...	40
Beans—after lea oats	...	...	40
Tares—after ditto	...	...	5
Potatoes, ruta бага and turnips—intended to be taken after wheat and lea oats	...	...	35
Summer fallow—after wheat	...	...	35
Old pasture	...	...	10
Clover and rye-grass—sown last year with fallow wheat	...	...	40
Ditto ... ditto with barley	...	...	10
			— 50
Fractions of the several fields	...	...	5
			—
	Acres	...	300

It was once my intention of giving a particular account of the expence required to stock and cultivate the farm to this date. But observing that this letter has already run to a great length, I must confine myself to an abstract detail of that expence, without going into the *minutiae* thereof.

Ploughing, harrowing, rolling, and hand gathering turnip and fallow land last year, before the term of entry	-	-	L. 50	10	0
Grass seeds for 50 acres	-	-	50	0	0
10 plough horses, at 55 guineas each			577	10	0
1 middle aged horse, as a supernumerary			20	0	0
1 saddle horse	-	-	60	0	0
3 milch cows	-	-	48	0	0
Ploughs, harrows, carts, rollers, and other implements	-	-	165	0	0
Saddler's account for harness, &c.	-	-	52	10	0
Sacks, ropes, &c.	-	-	14	5	0
Balance of arbitration with outgoing tenant, and expence thereof	-	-	23	12	0
Cleaning turnips, filling dung, spreading lime, and other incidental expences, last summer	-	-	35	0	0
Allowance to 7 servants for harvest maintenance last year, 3 firlots of meal each— <i>Inde</i> , 5 $\frac{1}{4}$ bolls, at 24s.	-	-	6	6	0
Expence of altering and improving the dwellinghouse	-	-	52	10	0
Furniture purchased, independent of linens, &c. from my mother	-	-	300	0	0
Horse corn last summer	-	-	64	16	0
Ditto from September last to this date, 120 bolls, at 24s.	-	-	144	0	0
Corn for 7 servants, one year, at 17 bolls each— <i>Inde</i> , 119 bolls, at 28s.			168	12	0
Smith, wright, and saddler, for one year			45	0	0
Lime purchased last summer	-	-	70	0	0
			<hr/>		
			Carry over	L. 1945	11 0

	Brought over	L. 1945	11	0
Seed corn, viz. :				
64 bolls wheat, at 45s.	L. 144	0	0	
6 ditto barley, at 32s.	9	12	0	
38 ditto oats, at 28s.	53	4	0	
50 ditto beans, at 30s.	75	0	0	
5 ditto tares, at 50s.	12	10	0	
		<u>294</u>	6	0
Grass seeds, this year, for 50 acres		50	0	0
Window tax, horse tax, &c.	-	25	0	0
Incidental expences, last winter, to this date		10	0	0
6 score of ewes, at 33l.	-	198	0	0
30 stots for wintering, at 15l.	-	450	0	0
Household expences since Whitsunday, as				
per book	-	120	0	0
		<u>L. 3092</u>	17	0
To which may be added,				
Expence of thrashing-machine, fanners, fir-				
lots, and other barn implements not yet				
valued	-	L. 120	0	0
Horse corn till harvest, 70 bolls,				
at 25s.	-	87	10	0
Household expences till ditto		50	0	0
Incidental expences in summer		30	0	0
Harvest expences	-	100	0	0
		<u>387</u>	10	0
		<u>L. 3480</u>	7	0

From the above, it appears, that a farm, such as mine, cannot be stocked, in a substantial manner, at a

less sum than L.11. 12s. per Scotch acre, or L.9. 5s. 6d. Sterling per English acre. Indeed, the tenant of such a farm ought to possess an additional sum at the outset, otherwise he stands a chance of being short of money before his first year's rent is paid, few farms being capable of paying full rent in the first instance.

It may probably be alleged, that the profits on cattle kept during the first summer, and those that may be gained from the live stock of this year, ought to be deducted from the above sum of capital stock, as these profits will be in hand before the period arrive when the account is finished. Though this is true, still it will not warrant such a deduction from the amount of stock; because these profits must be appropriated to the fund out of which the first year's rent is to be defrayed—a fund almost, in every case, a short one; therefore, standing more in need of aid, than capable of giving any assistance to supply a deficiency of original stock.

Thus I have given you a full, and, I trust, a correct account of my proceedings since this farm came into my possession; and, with many thanks for the numerous good advices repeatedly transmitted to me, I am,
&c.

pain of forfeiting this lease *ipso facto*, and without a process of declarator. Which tack, the said

binds and obliges himself, his heirs and successors, to warrant (under the provision expressed) to the said and his foresaids, at all hands, and against all deadly as law will. For which causes, and on the other part, the said binds and

obliges himself, and his heirs, executors, and successors whomsoever, to make payment to the said and his heirs and successors, of the sum of yearly, in name of rent or tack-duty, for the subjects before described; which rent shall be payable at two terms of the year, viz. Candlemas and Lammas, by equal proportions, the first moiety being payable at Candlemas, and the next at Lammas, all in the year for the rent of crop and year

and so forth during the currency of this tack, the rent of each crop being payable at the terms of Candlemas and Lammas, in the immediately succeeding year after the crop is reaped, with the legal interest of each terms rent, from the period at which the same shall fall due, and in time coming, during the not payment thereof, besides a fifth part more of penalty in case of failure. Moreover, with regard to the management of the lands hereby let, the said obliges himself and foresaids to cultivate and manure the same according to the rules of good husbandry; and, without prejudice to this generality, he for himself and foresaids, particularly engages not to take more than two white crops of grain in succession during any period of this tack, and also to have one eighth part of the arable land of the said farm in grass, during the last five years of

this lease, and also another eight part of the arable land of the said farm in grass, during the last four years thereof, making altogether one fourth of the arable land of the said farm, which grass is to be sown with a crop of grain upon land that had been properly summer fallowed and dunged in the preceding year, or that had carried a crop of drilled turnips properly manured and cleaned ; as also to sow down in the last year but one of this lease, ten acres of land with grass seeds, which land shall be properly fallowed and manured in the preceding year, and to leave the same, for the use of the proprietor or succeeding tenant, the said _____ being paid full value for that grass, as the same shall be estimated by persons mutually appointed ; likewise the said _____ binds and obliges himself, and his foresaids, to leave the whole straw upon the premises in steelbow at the conclusion of the lease, and likewise to leave the whole dung of the penult crop, for the use of the proprietor or incoming tenant, for which dung payment shall be made to him according to the valuation of arbiters mutually appointed ; and also to leave one eighth part of the whole farm in the last year of this lease, as a fallow or turnip break, to the proprietor or succeeding tenant, and to give one ploughing to that land ; for which labour, and the value of the land so left uncropped, he shall be paid according to the estimate of persons mutually appointed. And in respect the whole houses on the lands now set, are put into a proper tenantable and habitable state by the proprietor, the said _____ accepts of them as in such condition, and binds and obliges himself, and foresaids, to support and uphold them during the con-

tinuance of this tack, and to leave them at its conclusion in the like tenantable and habitable state. Moreover, with respect to the fences, gates, and gatesteads, of the lands now set, the said accepts of them in their present condition; it being expressly declared, that he and his foresaids are to have no claim for any expence which may be laid out by them in making or repairing any fences, gates, or gatesteads during the course of this lease; and also that the said or his foresaids, shall not have any claim against the said upon account of the fences, gates, and gatesteads at the expiration thereof. And the said binds and obliges himself and his foresaids to flit and remove themselves, their servants, stocking, goods and gear, from the subjects hereby let, at the expiration of this lease,—that is to say, from the dwelling house and stables at Whitsunday from the arable land at the separation of crop from the ground, from the grass at Christmas in the same year, and from the barns, straw houses, and cottages at Whitsunday without any previous warning, process of removing, charge, or other form of law being used for that effect, all such forms being hereby expressly dispensed with. *Lastly*, Both parties oblige themselves, and their foresaids, to perform their respective parts of the premises, under the penalty of One hundred pounds Sterling, to be paid by the party failing to the party observing or willing to observe the same, besides performance. And they consent to the registration hereof in the books of Council and Session, or others competent, therein to remain for preservation, and that letters of horning on six days charge, and all other necessary execution, may pass upon a de-

are therefore due in respect of calves, lambs, kids, pigs, wool, milk, cheese, eggs, and the like.

3. **PERSONAL TITHES** are the tenth part of the clear gain which is raised from the personal labour of a man, his charges and expenses according to his condition and degree being deducted; but these are only payable in such places as had accustomably for forty years before the stat. 2 and 3 Ed. 6. c. 13. paid personal tithes.

And by that statute neither day labourers are obliged to pay personal tithes, nor, according to 1 Roll's Abridgment, p. 646, fol. 25, husbandry servants, in respect of their wages.

4. Other ecclesiastical revenues usually considered with tithes, as part of the inheritance of the church, are oblations or obventions, pensions and mortuaries.

And they are either voluntary, or due by custom at a certain time—as upon marriage, baptism, purification of women, funerals, or the like.

And by the stat. 2 and 3 Ed. 6. c. 13. all who by the laws and customs of the realm ought to pay offerings, shall yearly pay them at the four most usual days, or otherwise at Easter.

5. **GREAT TITHES** are chiefly of wood, corn, or hay; and **SMALL TITHES** are in general, unless there has been an immemorial usage to the contrary, all other praedial tithes, besides corn, hay, and wood; and likewise those tithes which are mixed and personal.

6. OF THE PRODUCE OF THE EARTH: The tithes are to be set out and taken in manner following:

Wheat and rye—by the tenth shock, and by the tenth sheaf.

Barley and oats—by the tenth cock or shock, and also by the tenth sheaf.

Beans, pease, tares, and all other pulse—by the tenth cock, heap, or bundle.

Stubble—wheat stubble, employed in purposes of husbandry and tillage of the lands of the farm on which it grew, yields no tithe, but if sold or otherwise disposed of, then by the tenth of its value.

Hay, clover, and other artificial grasses—by the tenth cock of the first mowing, and also of the second when made into hay.

After-mawth of grass clover or other artificial grasses—if eaten by barren and unprofitable stock, by an agistment tithe.

Hobbings of grass in pasture—by the tenth cock.

Seeds of clover, artificial grasses, and also turnip, cole, and rape-seed—if grown for seed, by the tenth measure of the seed when thrashed out; or if sold, by the tenth of what it sold for.

Turnips—if pulled, by every tenth turnip or heap.

Turnips, rape, and cole—if eaten, whether by profitable or unprofitable stock, by an agistment tithe; if sold, by the tenth of their value.

Barren lands—titheable when cultivated.

Flax, hemp, and madder.—The tithes thereof are ascertained at five shillings per acre, and so in proportion for small quantities.

Woad or woald—by the tenth heap or gathering.

Saffron—by a tenth, when gathered, though only once in three years.

Hops—by a tenth part of the whole after picking; that is, after pulled from the bine.

Potatoes and other roots growing in fields—by a tenth of their produce when taken up.

Gardens—by a tenth of their produce.

Orchards—by a tenth of their produce, whether windfalls or gathered.

Nursery-grounds.—Their produce, whether fruits or plants, indigenous or exotic, if sold in the way of trade; by a tenth, or tenth of their value.

Timber-wood or charcoal—that is, oak, ash, and elm, above twenty years growth, yield no tithe, except when cut down and sold as fire-wood, or converted into charcoal.

Other wood.—All other wood of any growth, by a tenth, according to the quantity cut down, whether sold or not, except in counties where timber-wood is scarce, and any other wood is substituted, as beech and the like.

Osiers and willows—by the tenth bundle or pole, when cut.

Underwood.—Underwood, coppice-wood, loppings and toppings of old bowlings, loppings and toppings of trees, reeds, and germins, cut from stumps of trees, though above twenty years growth, by a tenth of their quantity when cut.

Hedge-rows and gorse or furze—if sold or not, used upon the farm on which they grow, by every tenth kil or faggot.

7. OF SHEEP. The tithes are to be taken in manner following :

Lambs—by every tenth lamb, to be taken away when able to live upon the same food the dam doth ; and the tenth of the value of the odd numbers : if sold upon the fall, the tenth of what they sold for : bought in and put to ewes, by an agistment tithe, to be computed from the time of weaning, unless kept until clip-day and clipped.

Ewes and lambs—sold or removed out of the parish before clip-day, by an agistment tithe, to be computed from the last clip-day.

Feeding sheep-shearlings, or hogs bred or bought in—by an agistment tithe, if sold or removed before clip-day, to be computed from the last clip-day ; but if bought in from that day, until sold or removed.

Sheep—bought in and kept until clip-day, by the tenth weight of their wool.

Sheep dying.—Dying after clip-day of the rot or otherwise, whether bought in or bred upon the farm, by an agistment tithe ; to be computed from the last clip-day, if bred on the farm ; but if bought in, from that time until they died.

Ewes removed out of the parish to lamb—by the tenth lamb, according to the number of ewes, and by the tenth of the value for the odd numbers.

Ewes or other sheep removed out of the parish to be clipped—by the tenth fleece, according to the number of sheep removed, and by the tenth of the weight of the odd fleeces.

Wool—by the tenth weight at the time of clipping.

Belts and locks—by the tenth weight when washed and dried.

8. OF BEASTS. The tithes are to be taken in manner following :

Calves—by the tenth, if ten ; to be taken at the time of weaning, and by a tenth of the value of all above or under ten ; if one or more, and sold upon the fall, or fed for the butcher, by the tenth of the price sold for, and in the same manner for all above ten.

Calves reared for the plough or pail—yield no tithe ; but if sold or removed before they are worked or milked, by an agistment tithe, to be computed from the time they become yearlings, until sold or removed.

Working beasts—yield no tithe while working, unless they work for hire or profit, or are employed in another parish than that in which the owner lives ; then by an agistment tithe.

Beasts turned off to feed—by an agistment tithe, to be computed from the time they are turned off until sold or removed.

Cows sold before calving or dying—by an agistment tithe, to be computed from the time they were let dry until they were sold or die.

Beasts bought in and sold again—by an agistment tithe, to be computed from the day bought in, until sold, except when kept in the straw-yard, and fed with straw ; but no exception if fed with hay, though the hay had before paid tithe.

Milk—by the whole of the milk milked on each tenth natural day, as well in the morning as in the evening, to be computed from the time the first cow, after calving, is brought to the pail and milked ; and so of every cow after calving, and no regard is paid to what they eat.

The cow-keeper is to give notice to the tithe-owner when and where he goes to milk his cows, and the

tithe is to be fetched by him from the place where the cows are milked, unless there be a custom in the parish for the cow-keeper to deliver it to the tithe-owner elsewhere, or at the church porch; and unless he milk his cows in another parish than that in which they are fed; for the tithe of milk is payable to the tithe-owner of the parish in which the cows are fed, and not in that in which they are milked; in which case he is not obliged to fetch it, but the cow-keeper must bring it to the tithe-owner.

9. OF HORSES. The tithes are taken in the following manner:

Foals—by the tenth, if ten, to be taken at the time of weaning, and by the tenth of the value of all above or under ten, if sold, before used for the plough, by an agistment tithe, to be computed from the time they become yearlings until sold or removed.

Horses—kept for working the farm yield no tithe while working; but if used for hire or profit, or employed in another parish than that in which the owner lives, then by an agistment tithe.

Saddle and pleasure horses.—Saddle horses, and horse used for pleasure only, yield no tithe, but if used for hire or profit, by an agistment tithe.

Horses turned up or bought to feed for sale—by an agistment tithe, to be computed from the time turned up or bought in until sold or removed.

Brood mares and horses—taken in to feed or agist at so much per week, by an agistment tithe for the time kept.

It is to be observed, that the true object of agistment is not the improvement of the animal, but the

tenth of what the land is worth to let, for taking in the cattle of another person to agist; and land on which cattle is fed for slaughter should be rated at double the value of the land on which store cattle is fed.

10. OF PIGS, the tithes are to be taken by the tenth pig, if ten, to be taken at the time of weaning, and for all above or under ten, the tenth of the value thereof at weaning.

Bought in and sold again—by the tenth of the clear profit thereof.

11. OF RABBITS AND DEER. Rabbits, if sold, by the tenth of both skin and carcase at every killing; and in like manner deer also will yield a tithe, if sold for profit, although *fera naturá*.

12. OF FISH no tithe is payable, except in certain places by immemorial usage.

13. OF PIGEONS the tithe is taken by the tenth of the value of all pigeons when sold.

Pigeon manure,—if not used on the farm, but sold, is also titheable by the tenth of the value sold for.

14. OF WILD FOWL taken in decoys and sold for profit, the tithe is taken by the tenth of the value when sold.

15. OF HONEY AND WAX the tithe is taken by the tenth measure of honey, and the tenth weight of wax.

16. OF EGGS the tithe is taken by the tenth egg of all turkeys, hens, geese, ducks, or any other domesticated fowl, and by the tenth weight of the feathers of geese.

17. OF MILLS, the tithe of corn-mills shall be paid of the clear yearly gains and profits, after deducting rent, servants' wages, repairs, and other real expences, except of ancient mills, erected before the 9th year of Edward the Second.

18. OTHER PARISH DUES, payable to the minister of the parish, consist of Easter offerings, mortuaries, and surplice fees.

Easter offerings—are payable for every person in the parish of sixteen years of age and upwards, by the master or mistress of a family, after the rate of two-pence per head.

Mortuaries—are for every person dying in the parish, possessed of moveable goods to the value of forty pounds and upwards, his debts first paid—10s.

If to the value of thirty pounds, and under forty pounds—6s 8d.

If to the value of six pounds thirteen and four-pence, and under thirty pounds—3s. 4d.

Except for beneficed clergymen, for whom a mortuary is only due to the bishop of the diocese wherein he held his benefice and resided.

Surplice fees—are payable for every marriage, whether by license or by banns, for every funeral, and every churching, according to the custom of the parish.

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- Page 16. 12th line from bottom, *for* damages *read* advantages
 109. 9th line from bottom, *for* grain *read* drain
 239. 8th line from top, *for* Fig. 5 *read* Fig. 3
 242. 5th line from top, *for* side *read* sod
 276. 8th line from bottom, *for* either *read* enter
 296. 13th line from top, *for* fig. 3 *read* fig. 34
 ib. 3d line from bottom, *for* fig. 55 *read* fig. 35
 298. 5th line from top, *for* fix *read* fit
 303. 11th line from top, *for* fig. 3 *read* fig. 15
 322. 11th line from top, *dele the words* the late
 476. 12th line from top, *for* barely *read* barley

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- Page 22. 12th line from top, *for* rural *read* real
 29. bottom line, *for* depend *read* depended
 53. 2d line from top, *for* moderate *read* modern
 61. 6th line from bottom, *for* sowing plough *read* swing
 plough
 67. 5th line from top, fill up the blanks with 2 and 3
 75. 3d line from top, *for* it *read* them
 248. 6th line from top, after the word *work* place a semi-
 colon or —
 304, 305, 306, 307, 308, 309, change the running title of
 these pages *from* 'On Inclosures,' *to* 'On Woods
 or Plantations of Timber Trees.'
 321. 3d and 4th line from the bottom, instead of the
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 must happen in settling,' &c. *read* 'the same
 errors must happen as take place in settling,' &c.

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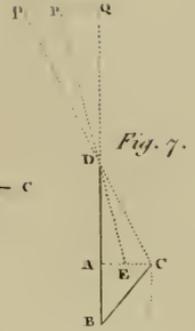
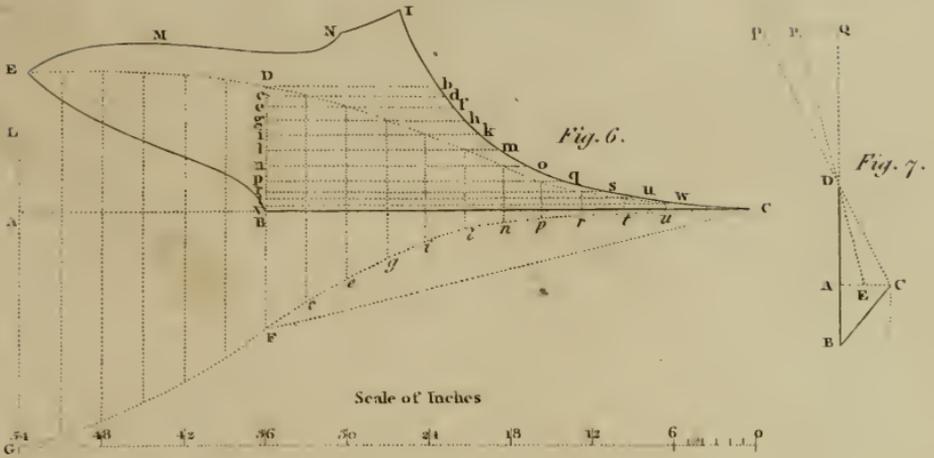


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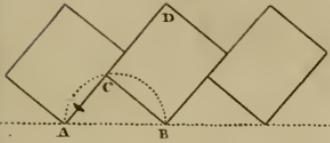


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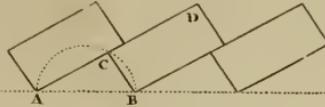


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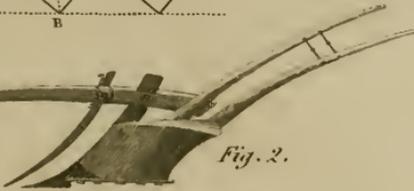
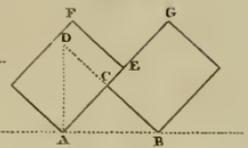


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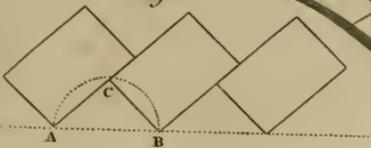


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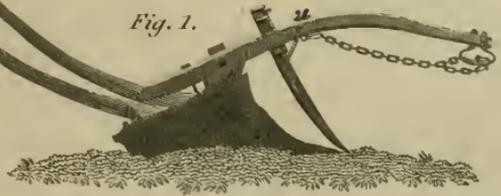


Fig. 12. Pairing Plough



Fig. 8.

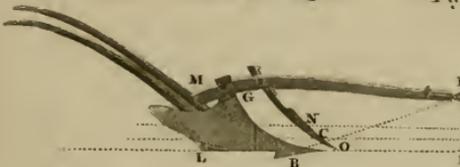
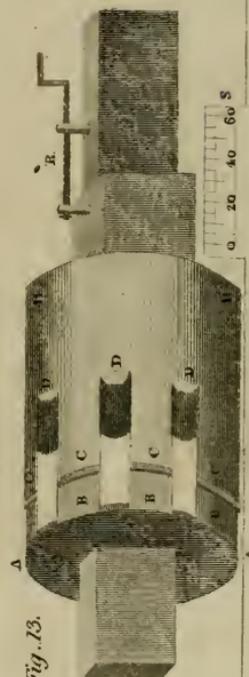
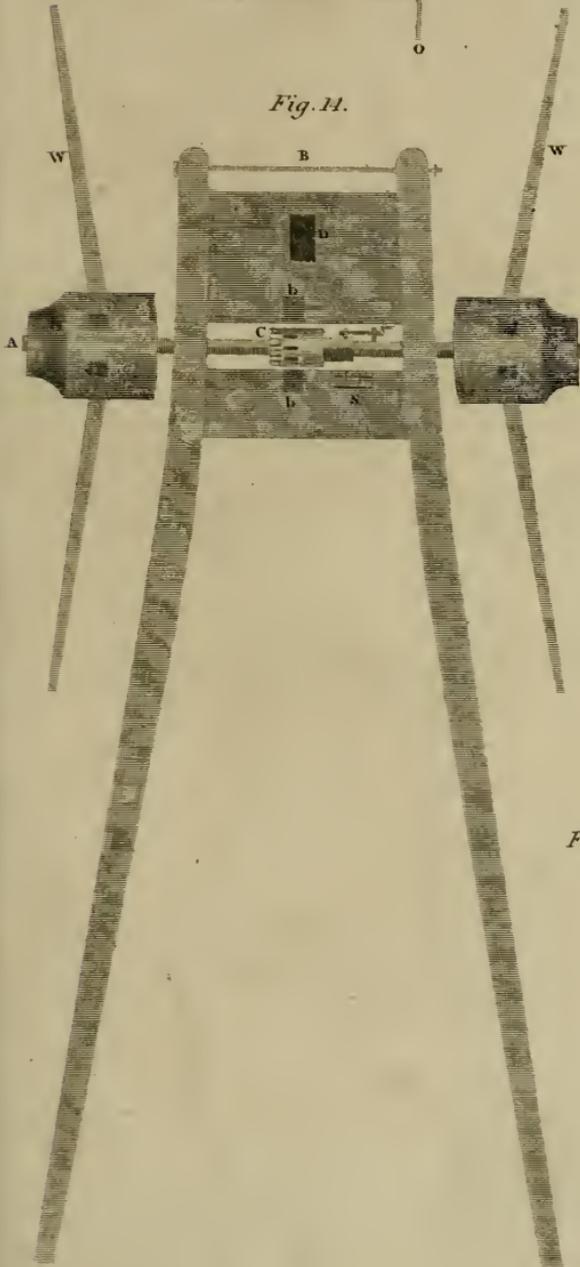
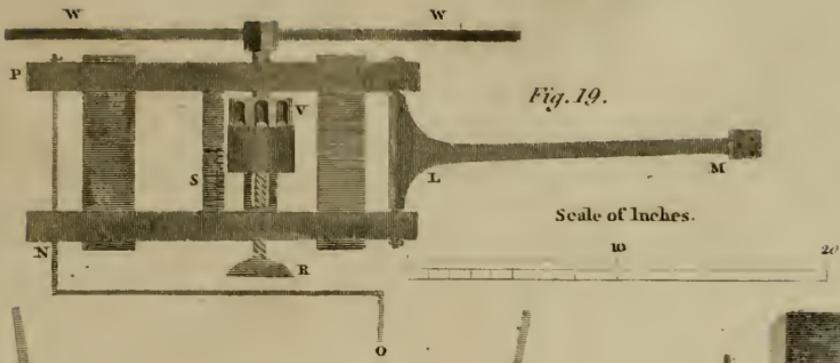
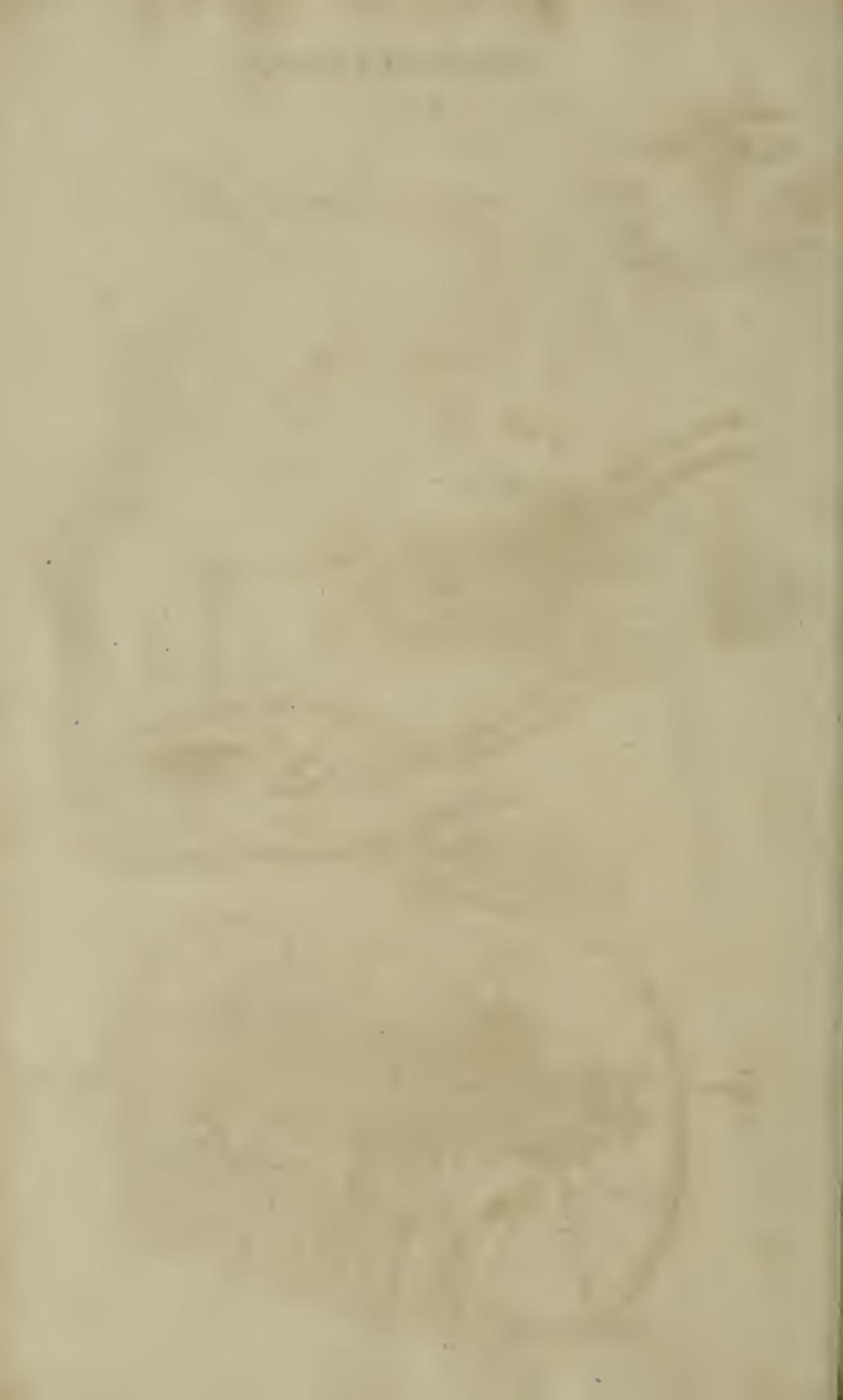


Fig. 3.



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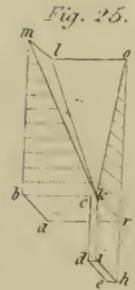
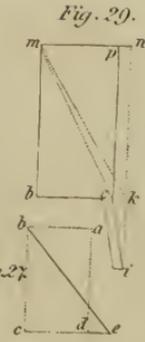
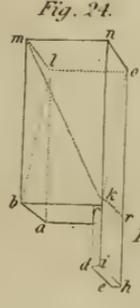
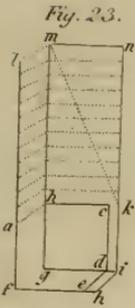
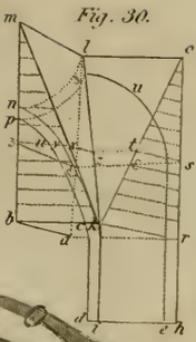
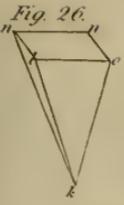


Fig. 21. X

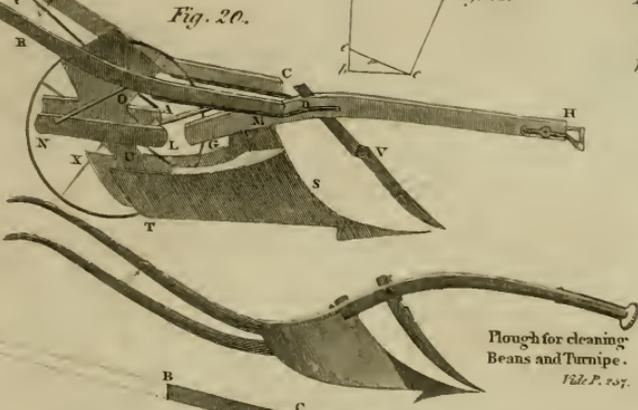


Fig. 20.

Plough for cleaning Beans and Turnips.
Vide P. 207.



Fig. 31.

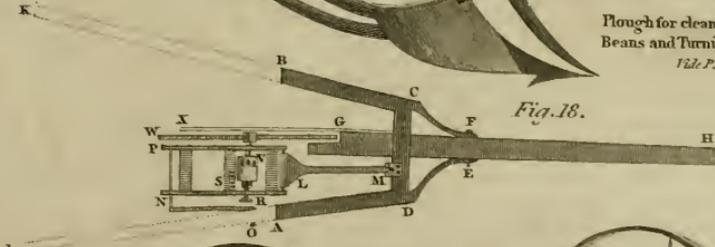


Fig. 18.

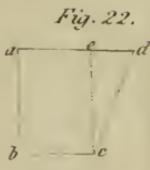


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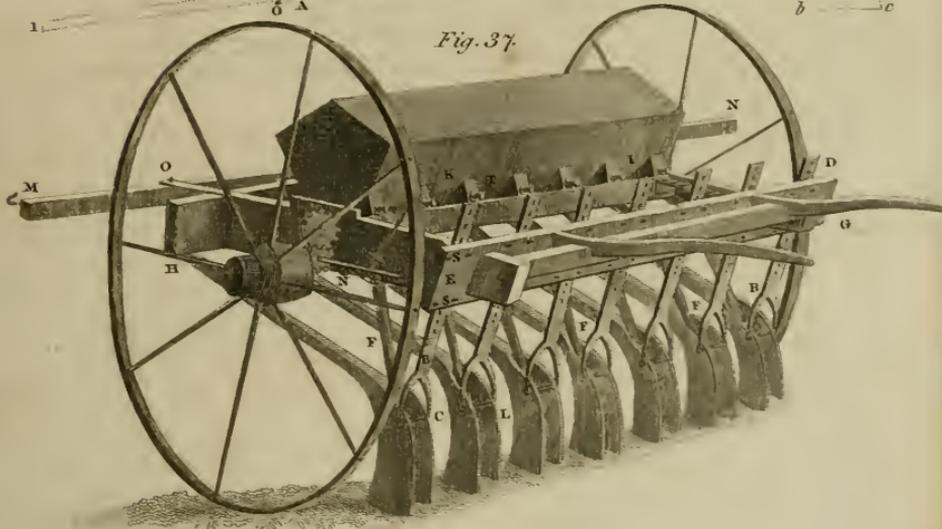
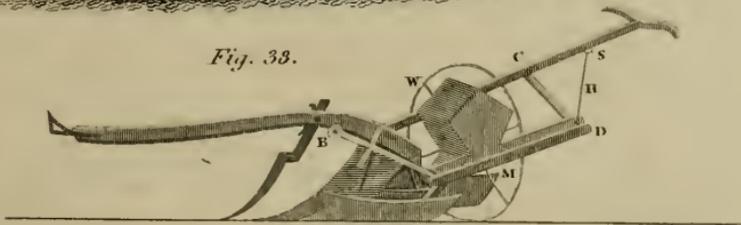
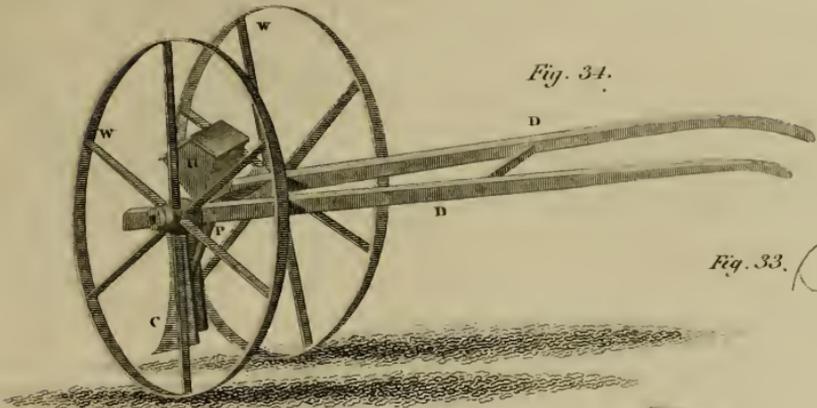
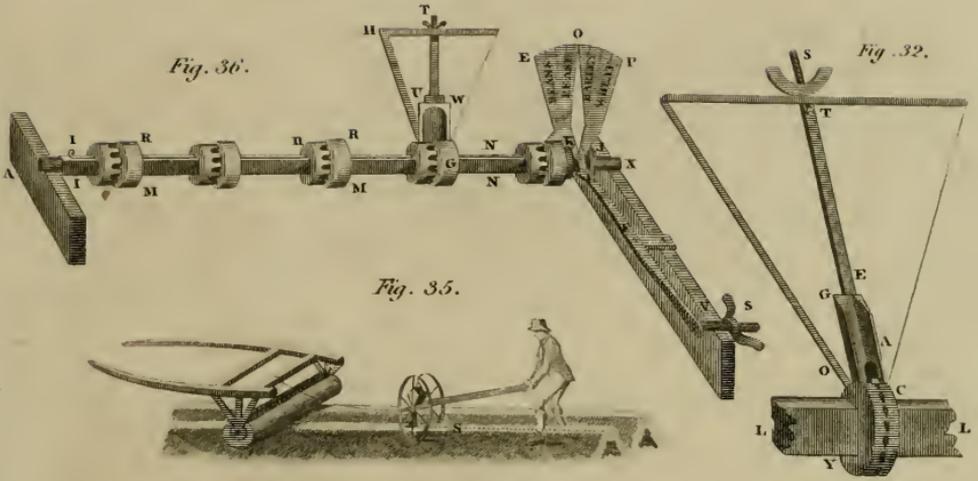


Fig. 37.

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Reaping Machine.

Fig. 39.

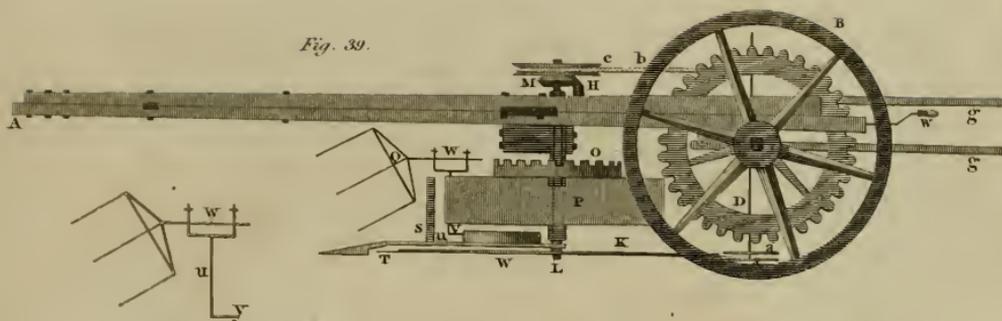


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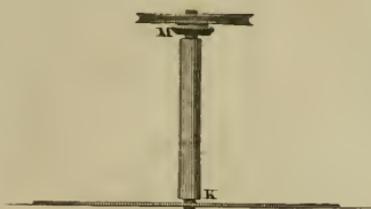


Fig. 42.



Fig. 41.

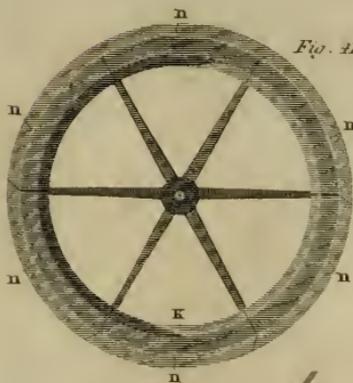
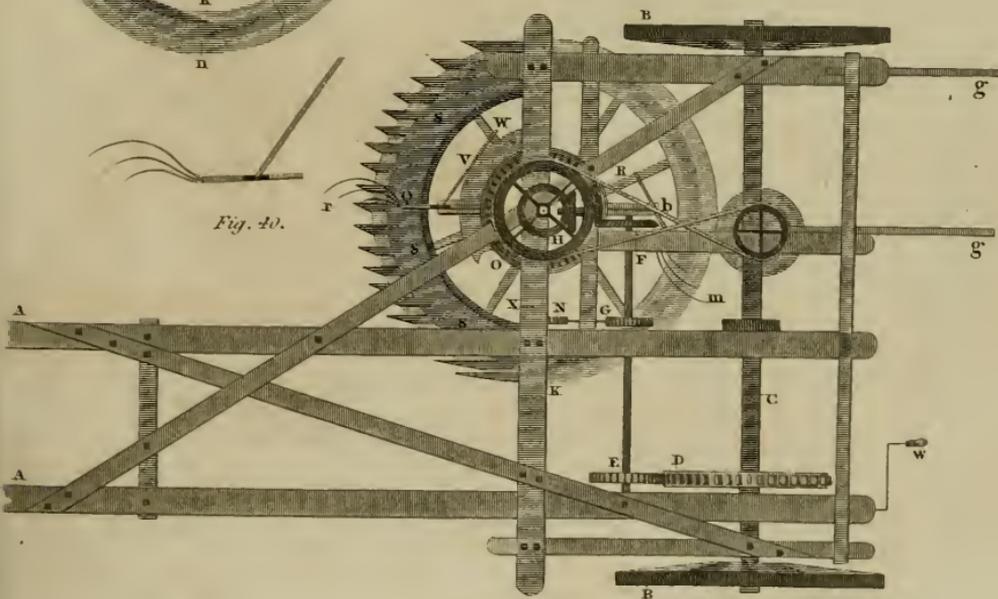
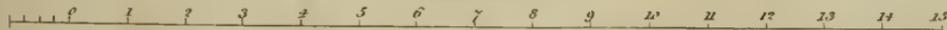


Fig. 40.



Scale of Feet



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THRASHING MACHINE.

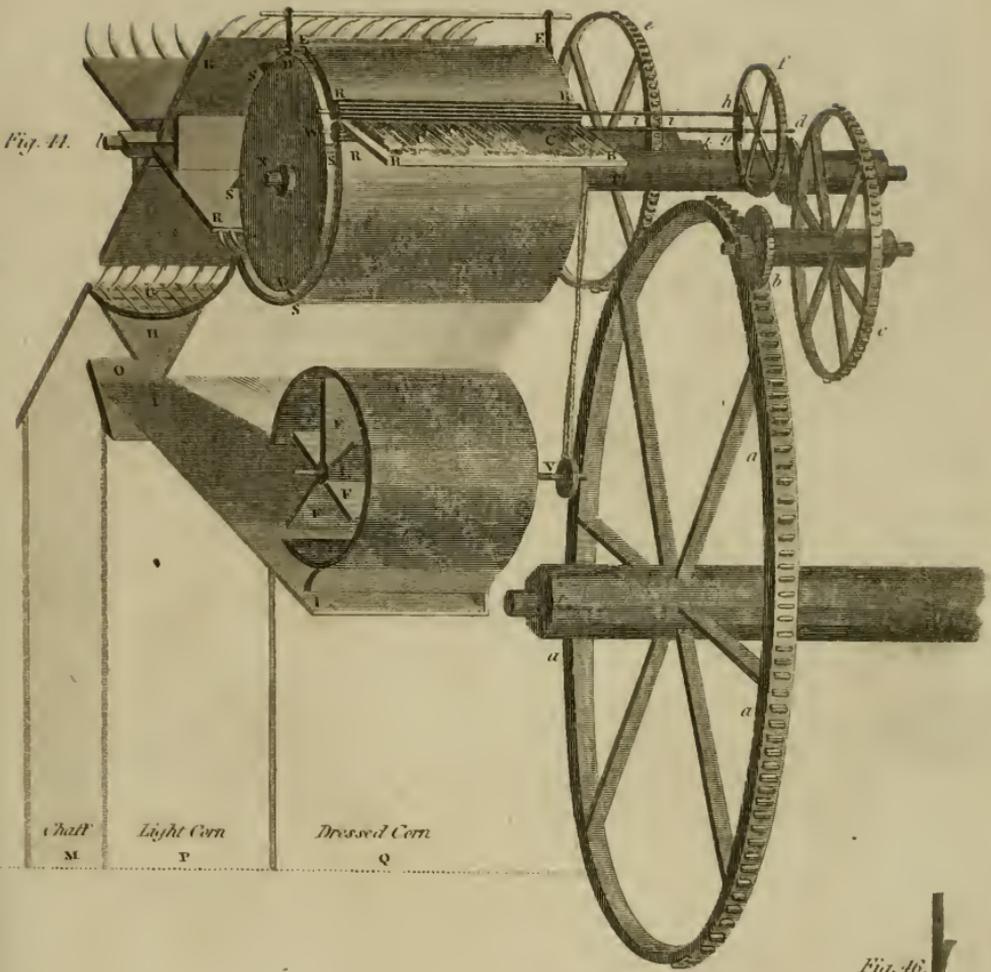


Fig. 16.

Fig. 15.

