THE

COMPLETE FARMER

AND

RURAL ECONOMIST;

CONTAINING

A COMPENDIOUS EPITOME OF THE MOST IMPORTANT BRANCHES OF AGRICULTURE AND RURAL ECONOMY.

BY THOMAS G. FESSENDEN,
EDITOR OF THE NEW ENGLAND FARMER.

Agriculture is the art of arts: without it, man must be a savage, and the world a wilderness.

SECOND EDITION.

REVISED, IMPROVED, AND ENLARGED.

BOSTON:
RUSSELL, ODIORNE & CO.
GEORGE C. BARRETT, BOSTON; GEORGE C. THORBORN, AND B. AND S. COLLINS, NEW YORK; DESELVER, THOMAS, AND CO., PHILADELPHIA; REYNOLDS AND BATEHAM, ROCHESTER, N. Y.
AND THE PRINCIPAL BOOKSELLERS IN THE UNITED STATES.
1835.

BOSTON:
STEREOTYPED BY SHEPARD, OLIVER AND CO.
No. 3, Water Street.

BOSTON:
Printed by Lewis and Penniman,
Bromfiel l Street.

PREFACE.

In the following pages, the object of the writer is to give brief, but it is hoped perspicuous and practical sketches of some important improvements in modern husbandry. In attempting to carry this design into effect, it has been his intention to insert no matter which is merely conjectural or speculative; to give place to nothing not worth the attention of the person whose livelihood depends on his pursuits as a cultivator; and who has neither time nor money to devote to such books as are expensive, voluminous, and foreign or remotely related to available improvements in husbandry.

With this view, the author has collected and generally abridged from the sources which his occupation as editor of the New England Farmer has made it his duty as well as his pleasure to explore, the materials of the little work now submitted. He does not pretend to have taken a wide survey of the field of husbandry, much less, in this tract, to have given a plan of the whole premises. But he hopes his observations, though limited, may prove serviceable so far as they extend. Agriculture is the most extensive as well as the most useful of the sciences, and as an art may be compared to the ocean, in which every stream of improvement in the moral and physical condition of mankind pours its contribution. Still it is not necessary to circumnavigate the whole of this world of waters in order to make voyages of valuable discovery. We cannot dip an oar nor launch a skiff in or upon the bosom of this great deep, without finding something to reward our adventures.

Agriculture, although the most ancient of the arts, not only coeval with, but in truth the sun from which emanated the dawn of civilization, is, nevertheless, the art in which the beneficial effects of modern improvement are most strikingly exemplified. Let us contrast its former with its present condition in Great Britain.

According to English laws in force from the fifth to the eleventh century, 'all the cattle of a village, though belonging to different owners, were pastured together in one herd, under the direction of one person, (with proper assistants,) whose oath in all disputes about the cattle was decisive. Their ploughs seem to have been very slight and inartificial; for it was enacted that no man should undertake to guide a plough who could not make one; and that the driver should make the ropes with which it was drawn of twisted willows. But slight as these ploughs were, it was usual for six or eight persons to form themselves into a society for fitting out one of them, and providing it with oxen, and every thing necessary for ploughing; and many minute and curious laws were made for the regulation of such societies. This is a sufficient proof both of the poverty of the husbandman and the imperfect state of agriculture among the ancient Britons of this period.'*

'By the laws of Ina, king of the West Saxons, who flourished in the end of the seventh and beginning of the eighth century, a farm consisting of ten hides or ploughlands was to pay the following rent, viz.: ten casks of honey, three hundred loaves of bread, twelve casks of strong ale, two oxen, ten wethers, ten geese. twenty hens, ten cheeses, one cask of butter, five salmon, twenty pounds of forage, and one hundred eels.'† Such has been the state of tillage in that country which is now eulogized as the garden of Europe!

Improvements in breeds of domestic animals by judicious crosses, and propagating from the best specimens of their species, as well as plentiful and suitable feeding, have advanced the state of agriculture more than the most sanguine advocate for scientific husbandry could have anticipated. To say nothing of the wonders effected by Bakewell and other eminent improvers in that department of husbandry, we will glance at the comparative states of the London cattle market at a distant and a less remote period. An English

* Loudon's Encyc. Agr. p. 36. † Wilkin's Leges Saxon, p. 25.

writer states that 'about the year 1700, the average weight of oxen killed for the London market was three hundred and seventy pounds; of calves, fifty pounds; of sheep, twenty-eight pounds; and of lambs, eighteen pounds. The average weight at present (about the close of the century) is, of oxen, eight hundred pounds; calves, one hundred and forty pounds; sheep, eighty pounds; and lambs, fifty pounds.' It would be a curious item in our agricultural knowledge, if information similar to what we have quoted relative to Boston and other American markets were correctly ascertained, faithfully recorded, and from time to time laid before the public. We should advance with more celerity and alacrity along the highway of improvement, if we had means of marking and giving comparative views of the progress which we have made and are making.

Some idea of the present state of agriculture in England may be gathered from the following extract from the journal of a traveller: 'Every spot of ground capable of being cultivated is improved. Wherever I have been the fields are generally small, inclosed by hedges, and made perfectly smooth by means of cast iron rollers. Numerous trees are left to grow around the hedges, and scattered over the fields. These are so nicely trimmed as to add greatly to the beauty of the country. Not a weed is suffered to grow. The crops all look well, and are much more productive than ours. The cattle and sheep feed on grass up to their knees, and look, as we should say, fit to kill. The slight inclosures that keep them in their pastures would be but a poor protection against our lean, half-fed, unruly animals. Here the cattle have no need to break fences. They have food sufficient within their own domains. I came here under the impression that this country was bare of trees. On the contrary, I find it better stocked in this respect than the thick settlements of our own country. We wantonly destroy trees as if they were of no value: here they are planted and nursed with as much care as if they bore choice fruit.'

Although we think the writer last quoted has somewhat exaggerated the defects of American husbandry, we must allow that his strictures are not so destitute of some foundation in reality as could be wished. We, however, have of late improved and are improving in every branch of culture, and bid fair soon to possess a system of agriculture as well adapted to our climate and circumstances as Great Britain, or even Flanders can boast of at present. Our fields may have a less imposing appearance, and our products may be less in proportion to the quantity of land we have under cultivation, and still our tillage be on the whole judicious. The agricultural implements and farming operations of the United States are in most particulars very similar to those of Great Britain. Circumstances and climate, however, require variations, which the sagacity of the American cultivator will lead him to adopt, often in contradiction to the opinions of those who understand the science better than the practice of husbandry. In Europe land is *dear* and labor *cheap;* but in the United States the reverse is the case. The European cultivator is led by a regard to his own interest to endeavor to make the most of his *land;* the American has the same inducement to make the most of his *labor*. Perhaps, however, this principle, in this country, is generally carried to an unprofitable extreme, and our farmers would derive more benefit from their labor as well as their land if they selected such parts of their possessions as they can afford to till thoroughly, and to manure abundantly. A man may possess a large estate in lands, without being called on by good husbandry to hack and scratch over the whole as evidence of his title. He may cultivate well those parts which are naturally most fertile, and suffer the rest to remain woodland, or having cleared a part, lay it down to permanent pasture; which will yield him an annual profit, without requiring much labor.

The climate and soil of the United States are well adapted to the cultivation of Indian corn, a very valuable vegetable, which cannot be grown to advantage in Great Britain. This entirely and very advantageously supersedes the field culture of the horse bean, (*vicia faba*) one of the most common fallow crops in that island. *Root-husbandry*, or the raising of roots for the purpose of feeding cattle, is, however, of less importance in the United States than in Great Britain. The winters are so severe that turnips can rarely be eaten by stock on the ground where they grow, and all sorts of roots are with more difficulty preserved and dealt out to stock in this country than in those which possess a more mild and equable climate. Hay is more easily made in the United States than in Great Britain, owing to the season for haymaking being more dry, and the sun more powerful in the former than in the latter country. There are many other circumstances which favor the American farmer, and render his situation more eligible than that of those who pursue the same occupation in most parts of Europe. He is generally the owner, as well as the occupier, of the soil which he cultivates; is not burdened with tithes; his taxes are light, and the product of his labors will command more of the necessaries, comforts, and innocent luxuries of life, than similar efforts would procure in any other part of the globe.

Not only have the inducements to agricultural improvements in the United States been powerful, but of late a corresponding effect has been the result. We cannot better make this evident than by a quotation from '*Remarks of the Rev.* M. ALLEN, *of Pembroke, county of Plymouth, state of Massachusetts, in the Legislature of that state, on a proposition to renew an Act for the Encouragement of Agriculture and Manufactures,*' published in the New England Farmer, vol. xii. p. 298.

'It has already been suggested that the soil of the county from which I came is not the most favorable for agricultural pursuits. The expense of cultivation there is thought by some to exceed the amount to be derived from it. This was the prevalent opinion before the introduction of modern improvements. The operations of an Agricultural Society have proved that labor and skill can make even despised soils productive. I suppose that ten bushels of rye to the acre, twenty of Indian corn, one ton of English hay, and two hundred bushels of potatoes, were formerly considered as average crops. Since premiums have been offered, we have claims for from forty to fifty bushels of rye, from one hundred and fifteen to one hundred and twenty-two of Indian corn, from three to four tons of English hay, and from four to five hundred bushels of potatoes. Our improvements have not been confined to single acres; in several instances the products of entire farms have been more than quadrupled.'

The advances of agriculture of late years have not been uniform, but accelerated; its progress has been in what mathematicians would call a geometrical ratio. Every step has furnished means for quickening the pace and extending the reach of the next step, and every path has led to a longer and wider avenue of improvement. The time may come in which science may impress into the service of the cultivator every element or substance which constitutes the globe we inhabit—the world of matter become completely subservient to the world of mind. Then and not till then will Agriculture have attained the utmost degree of perfection of which it is capable.

We cannot close these prefatory remarks without tendering our thanks to Mr. J. R. Newell, proprietor of the Boston Agricultural Warehouse, and Mr. G. C. Barrett, proprietor of the New England Farmer, and of the Boston Seed Store, for facilities and information afforded for the work which we have here submitted to the agricultural community. To Mr. Newell we are indebted for the Cuts and Descriptions which come under the head 'Agricultural Implements,' page 329; and Mr. Barrett has assisted us in the plan of this treatise. These gentlemen have for sale, at No. 52 North Market Street, Boston, the Machines, Implements, Seeds, &c., described or referred to in the following pages.

T. G. Fessenden.

Boston, *May*, 1834.

ADVERTISEMENT TO THE SECOND EDITION.

The first edition of *The Complete Farmer and Rural Economist* has met with a kind reception from a liberal and enlightened community, and a more rapid sale than the Author's most sanguine hopes had led him to anticipate. It has also been honored by favorable notices and reviews from competent judges, some of which are given on a preceding page. These encouraging circumstances have induced him to revise and correct it with care and circumspection, and to add several articles, including Rice, Tobacco, &c. with a view to adapt it to the southern, as well as to the middle and northern section of the Union.

In preparing the present edition for the press we have solicited the scrutiny, and been assisted with the advice of several gentlemen, eminent as practical and scientific cultivators, to whom we tender our best acknowledgments. And we beg leave to state that we are under great obligations to the Hon. John Lowell, who has revised the present edition, and thus given additional proof of his ability and readiness to promote the great art to which this little work is devoted, and of which he has long been a zealous, liberal and enlightened patron.

T. G. F.

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THE COMPLETE FARMER.

SOILS. A farmer should be well informed of the nature of soils, and of the various plants adapted to them. Some useful plants flourish best in what is called poor land; and if cultivators were perfectly acquainted with the art of adapting plants to soils, much manure might be saved, which is wasted by injudicious and improper application.

It is supposed by geologists that the whole of this earth originally consisted of rocks, of various sorts, or combinations. These rocks by the lapse of ages, and exposure to air and water, became disintegrated or worn in part or altogether to fine particles, which compose what is called earths or soils. These soils are chiefly silica, [sand or earth of flints] lime, [or calcareous earth] alumina, [clay] and magnesia, [a mineral substance.] With these are blended animal and vegetable matters in a decomposed or decomposing state, and saline, acid, or alkaline combinations.

Plants are the most certain indicators of the nature of a soil; for while no practical cultivator would buy or undertake to till land of which he knew only the results of chemical analysis, yet every farmer and gardener who knew the timber and plants a soil spontaneously produced, would at once be able to decide on its value for cultivation.

It was a maxim of Kliyogg, a famous philosophical farmer of Switzerland, 'that every species of earth may be instrumental to the improvement of another of opposite qualities.' All sands are hot and dry—all clays, cold and wet; and, therefore, the manuring sandy lands with clay, or clay lands with sand, is best for grain and pulse. But it is not the natural soil only that the farmer ought to consider, but the depth of it, and what lies immediately underneath it. For if the richest soil is only seven or eight inches deep, and lies on a cold wet clay or stone, it will not be so fruitful as leaner soils that lie on a better under stratum. Gravel is, perhaps, the best under stratum to make the land prolific.

The best loams and natural earths are of a bright brown, or hazel color. Hence, they are called hazel loams. They cut smooth and tolerably easy, without clinging to the spade or ploughshare; are light, friable, and fall into small clods without chapping or cracking in dry weather, or turning into mortar when wet. Dark gray and russet moulds are accounted the next best. The worst of all, are the light and dark ash colored. The goodness of land may also be very well judged of by the smell and the touch. The best emits a fresh pleasant scent on being dug or ploughed up, especially after rain; and being a just proportion of sand and clay intimately blended, will not stick much to the fingers on handling. But all soils, however good, may be impoverished, and even worn out, by successive crops without rest, especially if the ploughings are not very frequently repeated before the seed is sown.

If we examine tracts of land which have not been cultivated, we find nature has adapted different kinds of plants to most of the distinguishable varieties of soils; and though some belonging to one may for some cause or other be found on lands of a different quality, they seldom thrive, or perfect their seeds so as to become general. The great care of the farmer ought, therefore, to be, by proper mixtures, to reduce his land to that state and temperament in which the extremes of hot and cold, wet and dry, are best corrected by each other; to give them every possible advantage flowing from the benign influences of sun and air; and to adopt such kinds of plants as they afford in this state the greatest nourishment to; and to renew their fertility by a judicious allowance of the most proper manures. Where these things are done, there are few spots so unfriendly to cultivation as not to repay his expenses and labor with a plentiful increase. But without these, the best tracts of land will in time become a barren waste, or produce little but woods.

The color of soils is important. The Farmer's Journal observes, coal ashes were sprinkled over half the surface of beds, sown with peas, beans, &c., and on these the plants invariably appeared above ground two or three days earlier, obviously on account of the increased warmth; it being a well-known fact, that dark colored bodies absorb caloric more readily, and in larger proportions than those of a lighter hue.

Soils which absorb the most moisture are the most fertile. Sir Humphrey Davy observed, 'I have compared the absorbent powers of many soils with respect to atmospheric moisture, and I have always found it greatest in the most fertile soils; so that it affords one method of judging of the productiveness of land.'

The methods of improving soils are too numerous to be here fully specified. We will, however, quote one mode of restoring worn out fields to the fertility of new lands, or lands lately cleared from their aboriginal growth of timber, quoted from a '*Dissertation on the mixture of soils*,' for which the author, the Rev. Morrel Allen, of Pembroke, Massachusetts, was awarded a premium by the Plymouth County Agricultural society.*

'Particles in a soil, which had long been in contact, and in consequence of long connexion lost much of the energy of their action on plants, are separted in mixing soils, placed in new connexions, and act with renewed vigor. But the most permanent and best effects are always expected from the mixture of soils of different qualities. When the object is to produce as much immediate influence as possible, merely to assist one short rotation of crops, to have the application we make act chiefly as manure, then we may take our materials from any situation where we know vegetable substances have fallen and decayed.

'We may go into forests, and in certain stages of the growth of the wood, without any perceptible injury, skim the surface of the whole lot. This soil of the woods, carried in sufficiently large quantities on to old fields, will restore them to original productiveness. And this will sometimes prove an inexhaustible resource for renewing old fields; for as often as the fields decline, the soil in the wood lot will be again renewed and fit to remove. For the same purposes the earth should be carried from the sides of walls and fences, where the leaves have been lodged from the forests. It should also be carried from hollows and temporary ponds, which in certain seasons of the year become dry, and afford

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* See N. E. Farmer, vol. x. p. 249.

immense quantities of vegetable matter in different stages of decomposition, and suitable to apply to any kind of soil.

'Where streams of water occasionally overflow the banks, an abundance of vegetable and earthy matter is lodged on the meadows, which in many cases, especially where there is not much extent of meadow to receive the substances conveyed by the stream, it is prudent to remove on to higher land. It will there act as manure, and at the same time gradually alter the texture of the soil, rendering it more retentive of dew and rain, and easily penetrated by the fibrous roots of plants. Of the value of those substances which are carried in streams of water to enrich soils, we have the most convincing proof in the unexampled productiveness of interval lands. It is not exclusively the vegetable substances carried on to these lands which make them so astonishingly productive; there is a portion of every kind of soil existing in the surrounding country annually carried on with the vegetable substances. Intervals are composed of every sort of earth the water can reach and remove. This circumstance may properly encourage the mixtures of many kinds of earth, even when there is no particular evidence that each kind is especially adapted to remedy any deficiency in the soil which we would improve. There is less hazard in administering medicines in great profusion to cure diseases in the soil, than in the human body. In stepping out of the beaten path of habitual practice, and calling attention to experiments, which to some may look very simple, and to others very absurd, we may become instrumental in the discovery of highly important truths.'

It will not do however to spread pond mud directly on grass land or on arable ground. An experienced farmer informs us that he once injured a piece of grass land by spreading pond mud upon it without preparation. It should be mixed with lime and warmer manure, and exposed to the atmosphere, or put into the barn-yard to be trodden upon by cattle.

Arthur Young lays it down as a maxim, that a strong, harsh, tenacious clay, though it will yield great crops of wheat, is yet managed at so heavy expense, that it is usually let for more than it is worth. Much money is not made on such land. The very contrary soil, a light, poor, dry sand, is very often, indeed, in the occupation of men who have made fortunes. Some permanent manure is usually below the surface, which answers well to carry on; and sheep, the common stock of such soils, is the most profitable sort he can depend on.

GRASSES. The limits of our plan will oblige us in this, as in many other articles, to omit, or give but brief sketches of subjects which might be profitably attended to in more minute detail.

Grass is a general name for plants used in feeding cattle in a green or dry state, for hay, or for pasture.

It would require a large volume to describe all the kinds of grass which are or may be cultivated in the United States. Sir John Sinclair observed, (Code of Agriculture, p. 219,) that there are in all two hundred and fifteen grasses, properly so called, which are cultivated in Great Britain. The duke of Bedford caused a series of experiments to be instituted by George Sinclair, to try the comparative merits and value of a number of these grasses, to the amount of ninety-seven, the result of which is annexed to Sir Humphrey Davy's Agricultural Chemistry. According to these experiments, tall fescue grass (*festuca elatior*) stands highest as to the quantity of nutritive matter afforded by the whole crop, when cut at the time of flowering; and meadow cat's-tail grass, *phleum pratense*, called in New England *herd's grass*, and timothy grass in the southern states, affords most food, when cut at the time the seed is ripe.

An able and elaborate article on the grasses, written by Judge Buel, republished from the American Farmer, was given in the New England Farmer, vol. ii. p. 161, 174. This consisted of a '*Table, exhibiting, in one view, the comparative value of some of the best grasses cultivated in the United States and in Great Britain, their products, nutritive matter, time of flowering and seeding*, &c.' To this are added remarks, from which we have extracted the following:

'I have found in our publications on agriculture very little information on the improvement of our meadow and pasture grounds. Indeed, the names of our native grasses are scarcely enumerated, much less are their habits described, or their relative merits for hay and pasture pointed out, in any American work which has fallen within my notice. A considerable portion of our lands are unsuitable for the system of convertible husbandry, that is, an alternation of grain and grass crops. Of this description are our stiff clays, marshes, and swamps, and all those lands in which tillage is rendered difficult by reason of hard pan, stones, or wetness. These should be improved as permanent meadows and pastures; and it is of the first importance to the farmer to know the grasses which will render them most conducive to profit: for that our grass grounds are as susceptible of improvement as our tillage grounds, by a suitable selection of seeds and suitable management, must be apparent to every reflecting mind. The improvement and productiveness of our cattle and sheep husbandry, which at this time deservedly engage much of the public attention, depend materially on this branch of farming.'

After adverting to the sources from which the writer derived most of his information, he proceeds:

'*Sweet-scented Vernal Grass.* This is a grass of diminutive growth, and is not worth cultivating for hay. It is nevertheless considered as valuable in pasture on account of its affording very early feed, and growing quick after being cropped. We are advised by Muhlenburg that it delights in moist soils, by the Bath papers that it does well in clayey loams, and by Dickson that it grows in almost any soil, including bogs and sands. G. Sinclair says it is eaten by oxen, horses, and sheep, though not so freely as some other grasses are.*

Meadow Fox Tail possesses all the advantages of early growth with the preceding, and is much more abundant in product and nutriment. It generally constitutes one of five or six kinds which are sowed together by the English farmers for pasture; and affords withal a tolerable crop of hay. It does best in moist soils, whether loams, clays, or reclaimed bogs. Sheep and horses have a better relish for it, says G. Sinclair, than oxen.

Rough Cock's Foot. Dr. Muhlenburgh and T. Cooper concur in opinion that this is the *orchard grass* of the United States, though some that I have raised as orchard grass does not seem to correspond with the figure of the *dactylis glomerata*, in the second volume of Dickson's Farmer's Companion. In England, cock's foot is taking the place of rye grass with clovers. Arthur Young speaks in high commendation of it; though all writers concur in the opinion, that

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* Judge Buel does not seem to have been personally acquainted with this invaluable grass. Its proper situation is *high*, well drained meadows. It constitutes, in such meadows, in Massachusetts, at least one-half of the whole crop. Its chief fault is that it is too early for the other grasses, but it affords a second and even third crop if cut early. It is the grass which gives the finest flavor so grateful to milch cows.

it should be frequently and closely cropped, either with the scythe or cattle, to reap the full benefit of its great merits. I should prefer it to almost every other grass; and cows are very fond of it. Cooper rates it above timothy, and says it is gradually taking the place of the latter among the best farmers about Philadelphia. This is probably owing to the fact that it is earlier than timothy, and of course more suitable to cut with clover for hay. Its growth is early and rapid, after it has been cropped. It does well on loams and sands, and grows well in shade.

If farther facts are wanting in favor of this grass for pasture, the reader will find them in an article in the American Farmer of the 14th November, 1823, with the signature, supposed to be colonel Powel's, a gentleman who combines as much science with judicious practice, especially in cattle and grass husbandry, as any person in the Union. He says, "I have tried orchard grass for ten years. It produces more pasturage than any artificial grass I have seen in America." Sow two bushels of seed to an acre.

Tall Oat Grass. Both Arator (Mr. Taylor) and Dr. Muhlenburgh have placed this at the head of their lists of grasses, which they have recommended to the attention of the American farmer. The latter says it is of all others the earliest and best grass for green fodder and hay. The doctor was, probably, not apprized of its deficiency in nutritive matter as indicated in the table. It possesses the advantage of early, quick, and late growth, for which the cock's foot is esteemed, tillers well, and is admirably calculated for pasture grass. I measured some on the 20th of June, when in blossom, when it should be cut for hay, and found it four and a half feet long. The latter math is nearly equal in weight, and superior in nutritious matter to the seed crop.

Tall Fescue, although a native grass, has not fallen under my personal observation. It stands highest, says Davy, according to the experiments of the duke of Bedford, of any grass, properly so called, as to the quantity of nutritive matter afforded by the whole crop, when cut at the time of flowering; and meadow cat's-tail (timothy) grass affords most food, when cut at the time the seed is ripe. It grows naturally in wet grounds, in bog meadows, and on the sides of ditches often to the height of four or five feet. Our ignorance of agricultural botany, and of the intrinsic value of this grass, can alone have prevented its being more generally known and cultivated. It must be very valuable for wet grounds, as from its rapid growth it is calculated to smother or keep down the coarser kinds, which naturally abound in these situations.

Rye Grass is extensively cultivated in Scotland and the north of England, and where cock's foot has not superseded it, is generally mixed with clover seeds. It is rather declining in public estimation. It does well in pasture; and as it contains much nutriment, is considered valuable for cows and sheep. Dickson says it does best in rich moist meadows. Young does not speak well of it.

Red Clover. There are many species of the *trifolium*, and several varieties of the red clover. Whether the kind we generally cultivate is the *pratense*, or not, I am unable to determine. The character of red clover as an ameliorating fertilizing crop, is too generally known to require illustration. It cannot be depended upon for permanent grass lands; though it yields to no grass for alternating with grain in convertible husbandry. It formerly was as indispensable in a course of crops in Norfolk, England, (which has been considered pre-eminent for good tillage,) as turnips; and the maxim was, and still is, 'no turnips, no crops.' But it appears from Young's survey of that country, that it cannot now be depended on oftener than once in from eight to twelve years. Trefoil, white clover, cock's foot, rye grass, &c., are therefore alternated with red clover in the grass years. There is reason to believe that neither red clover, nor other grasses, will bear repeating for a course of years upon the generality of soils. They exhaust the ground of the peculiar nourishment required for their support. In Great Britain white clover, trefoil, rye grass or cock's foot are generally sown with red clover seeds. From twenty to thirty pounds of seeds are sown to the acre. In the northern states, timothy is generally sown with clover; though the mixture is an improper one for hay; for the clover is fit for the scythe ten or fifteen days before the timothy has arrived to maturity. If sown alone, from eight to sixteen pounds of clover seed should be put on an acre; more on old land than on new.

White or *Dutch Clover*, (*trifolium repens*,) is considered in England of importance to husbandry, if we are to judge from the great quantity of seed which is there sown annually. With us, many districts produce it spontaneously; but it is too seldom sown. It shrinks greatly in drying, and does not contain as much nutritive matter as red clover; yet its value as a pasture grass is universally admitted. Its increase is very much facilitated by a top dressing of gypsum lime or ashes.

Lucerne, although affording much more green food, contains less nutriment in a single crop than red clover. It must, however, be borne in mind, that it grows much quicker than clover, and will bear cutting twice as often. In the soiling system, an acre of lucerne will keep four cattle or horses from the 15th May to the first of October. I cut a piece about the 15th of May, and again about the 20th of June, to feed green, and then ploughed the ground, and cropped it with ruta baga, which yielded sixteen tons to the acre of roots, as fine as I ever saw. Mr. Fowell (see Young's Norfolk, p. 345) derived a clear profit of *thirteen pounds seventeen shillings and four-pence per acre* from his lucerne, fed green to working horses. This is almost equal to sixty dollars the acre. An idea has prevailed that it will not thrive in this latitude, (42–3,) but the experiments of the late chancellor Livingston, and of Le Roy de Chaumont, prove otherwise. I sowed seed in 1821, at the rate of six pounds the acre, with barley. It has stood the winters well, much better than clover; and has been in a state of progressive improvement. Drought has not affected it. The plants are very tender the first year; and require either a very clean tilth, or to be kept free from weeds and grass with a hoe the first year. It should have a deep loam, as it sends down tap roots five or six feet; and it is equally necessary that the ground should not be wet. It may be sown either in drills or broad-cast, with or without grain. Fifteen pounds of seed are required for the acre if drilled, and twenty is not too much if sown broad-cast. To the proprietor of a dairy, an acre or two of lucerne would be valuable, to be fed to his cows in addition to ordinary pasture.*

Long-rooted Clover is a native of Hungary, and I do not think has ever found its way across the Atlantic. The root is biennial, and if sown in the fall, lasts only during the next season. It penetrates to a great depth in the ground, and consequently is but little affected by drought. It therefore requires a deep dry soil. The product of this grass, when compared to others that are allied to it in habit and place of growth, proves greatly superior. It affords twice the weight of grass, and more than double the nutritive matter

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* For farther remarks on the culture of lucerne, see N. E. Farmer, vol. ix. p. 342.

that is given by the common clover. It gives abundance of seed; and, says G. Sinclair, if the ground be kept free of weeds, it sows itself, vegetates, and grows rapidly, without covering in, or any operation whatever. Four years it has propagated itself in this manner on the space of ground which it now occupies, and from which this statement of its comparative value is made. This species would, no doubt, prove a valuable acquisition to our husbandry, whether we consider its value for green food, hay, or as a green crop to be turned in preparatory to grain.

Sain Foin is peculiarly adapted to a calcareous or chalky soil. It is true it is cultivated in Norfolk, England, which is a soil of sand and loam, naturally destitute of calcareous matter. But it is common there to dress their lands with clay marl, which abounds with carbonate of lime; without which dressing, says Young, Norfolk soils will not grow sain foin. This writer considers it 'one of the most valuable plants that were ever introduced into the agriculture of Great Britain.' The well-known Mr. Coke cultivates four hundred acres of this grass, and sows it without other seeds. Several attempts have been made to cultivate sain foin in this country, but hitherto I believe without success.*

Timothy. This grass is distinguished in Great Britain by the name of *meadow cat's-tail;* in New England by that of *herd's grass.* It is one of the most valuable grasses that are cultivated; and, what is worthy the notice of every farmer, it affords *more than double* the nutriment when cut in the seed to what it does in the flower. In tenacious, strong, and moist soils it is entitled to a precedence, perhaps, to any single grass for hay, yet does not seem to be suitable to mix with clover seeds when intended for meadow. Another consideration, which renders it particularly worthy of attention, is the seed which it affords, and which may be saved without materially diminishing the hay crop. From ten to thirty bushels of seed may be taken from an acre of timothy, which, at the price it now bears, is of itself a handsome remuneration.

Fiorin has of late years been brought into notice in Great Britain, by the experiments of Dr. Richardson; who particularly recommended it for the cold boggy soils of the

* Sain foin may be considered as out of the question in New England. So large a portion is winter-killed that it is not worth cultivation. This is affirmed on the strength of repeated trials.

mountainous districts, where ordinary grasses would not thrive. The peculiar value of the fiorin, and of other grasses of the agrostis family, arises from their fitness for *winter pasture:* as they lose very little of their bulk or nutriment by remaining in the soil after they have ceased to grow. Its name (*creeping bent* or *couch grass*) implies a difficulty in mowing it, except on a surface perfectly smooth. We have seen it recommended to the notice of American farmers; but from the very limited progress which seems to have been made in its cultivation we infer that it has fallen short of public expectation.

Upright bent Grass. Dr. Muhlenburgh considers this the *herd's grass* of the southern, and the foul meadow of the eastern states, of which *white top* and *red top* are varieties. This grass is more congenial to our climate than to that of England. In any boggy soils, both varieties of this grass have come in spontaneously, as soon as the ground has been cleared and drained, have soon formed a compact sod, and afforded good hay and good pasture.

Flat-stalked Meadow Grass. This, according to Muhlenburgh, is the *blue grass,* which is considered as a pest in many of our tillage grounds. The small crop which it gives, and the little nutritive matter which this affords, shows the little dependence which ought to be placed on it for grazing, or for hay.

Smooth-stalked Meadow Grass is a native plant, and is well adapted for permanent pastures. It grows quick after being cropped, and does well upon dry ground.

Floating Fescue grows well in swamps and bog soils, where good kinds are most wanted.

I would suggest, with much deference, whether grasses may not be divided, for the *practical* benefit of the farmer, into three kinds, to wit: *Cultivated grasses.* All kinds, strictly speaking, which the soil does not produce spontaneously, are cultivated grasses. But the term as generally used, and in the sense I here employ it, applies only to such as are sown to *alternate with grain, pulse, and roots, in a systematic rotation of crops.* The grasses selected for this purpose are, generally, the red clovers, lucerne, sain foin, orchard, tall oat, timothy, or rye grass. Clover is the primary dependence on all soils which will grow it, and especially where gypsum can exercise its magic powers. As vegetables are said to exhaust the soil in proportion to the smallness of their leaves, (the larger the leaves the more nutriment they draw from the atmosphere, and the less from the soil,) clovers are entitled to the high commendation they have obtained among American farmers. But as these plants are liable to permature destruction by the frosts of winter, it is both prudent and wise to intermix with their seeds those of some other grasses more to be depended on.

For this purpose,

On sands, loams, and gravels, and these constitute the soils usually employed in convertible husbandry, the orchard grass or tall meadow oat grass appear to be best calculated to insure profit. They grow early, delight in a clover sod, and are fit for the scythe when clover is in the bloom, the time it ought to be cut. The hay from this mixture may be made before harvest commences; and if the soil is good, a second crop may be cut almost equal to the first. If intended for pasture the second year, either of these grasses will afford more abundant food than timothy.

In clays, the meadow fox tail, an excellent grass, might be substituted, though, according to Sinclair, the tall oat grass will do well here also. *In wet soils*, where clovers do not grow well, timothy and meadow reed grass would be a good selection, sown either separate or together.

Lucerne and sain foin require a deep dry soil, and are generally sown without other seeds. The first does not attain to perfection before the third year; and both, where successfully cultivated, are permitted to occupy the ground from six to eight years.

2d. *Meadow grasses.* In selecting these the object is to obtain the greatest burthen of good hay, and to mix those kinds which may be profitably cut at the same time.

For clayey and moist soils, many valuable and nutritious kinds seem to be well adapted; that is to say, meadow fox tail, timothy, tall oat, meadow soft grass, floating fescue, rye grass, reed meadow, smooth-stalked meadow, American cock's foot, upright bent or herd's grass, and tall fescue. And the five last are peculiarly suited to swamp or *bog soils.* For *dry loams, sands, and gravels*, which never ought to be kept long in grass, the cock's foot or orchard grass, and tall oat, are probably the best; and to these might be added red and white clover.

The great difficulty is to prevent the deterioration of meadows. This takes place from the better grasses running out, and giving place to coarser kinds, in moss, and to useless or noxious plants, aided often by a neglect to keep them well drained. The finer and more nutritious kinds thrive best in *moist*, though they will not live long in *wet* soils. Hence it is of the first importance to keep the surface soil free from standing water, by good and sufficient ditches; and it often becomes necessary, and it is in most cases advisable, on a flat surface, to lay the land in ridges at right angles with the drains. Another precaution to be observed is not to feed them with stock when the soil is wet and poachy. Harrowing in the fall has been found beneficial to meadows. It destroys mosses, and covers the seeds of grasses which have fallen, or may be sown, and thus produces a continued succession of young plants. In Europe, lime is used with good effect as a top dressing to grass lands, as are also ashes. With us, the annual application of a bushel of gypsum to the acre is found beneficial. It not only thickens the verdure with clover, but is of advantage in most other grasses. Stable manure should be used only when it can be spared from the more profitable uses of tillage. When the means above enumerated fail to insure a good crop of hay, it is time to resort to the plough, and a course of crops.

3d. *Pasture grasses.* But few of the grasses most valued in Great Britain for pasture are the natural growth of the United States; but it is believed that if the seeds are once introduced upon our farms, we shall find little difficulty in naturalizing them. Neither the orchard nor vernal grass, which are said to be indigenous to our country, are recognised in the grass lands which have come within my observation: yet they constitute, with fox tail and tall oat grass, the earliest and most valuable varieties for perennial pastures. The meadow fox tail and orchard grass, together with our white clover and green meadow grass, *poa trivialis*, (which seldom require to be sown,) I think would form the best selection for all grounds which are moderately dry. The rye and oat grasses, or meadow soft grass, might be either substituted for the two first, or combined with them. These would afford spring, summer, and fall feed, abundant in quantity and wholesome and nutritious in quality. On wet soils, (though pastures require to be drained, as well as meadows, to insure a rich herbage,) the tall fescue, smooth-stalked meadow, upright bent, and herd's grass, may be introduced to advantage. Gypsum is applied to pastures with the same benefit that it is to meadows.'

Two able papers, '*On Grasses*,' have been written by the Hon. John Welles, for the *Massachusetts Agricultural Repository*. One of these, republished in the New England Farmer. vol. i. page 235, contains the following observations on the loss of weight of certain grasses, by evaporation, 'in the process of drying or making, for safe and useful preservation.'

It should be premised that the time of cutting the several grasses, &c., in the following statement, was the same as is usually practised by husbandmen in this state.

'Of 100 lbs. of vegetables, cured in 1822, the product was as follows, viz.:

100 lbs.	of green white clover gave of hay,		17½ lbs.
100 "	of red do.	"	27½ "
100 "	of herd's grass,	"	40 "
100 "	of fresh meadow,	"	38 "
100 "	of salt grass,	"	39 "
100 "	of mixed 2d crop, English rowen,	"	18¾ "
100 "	of corn stalks,	"	25 "
100 "	of do. cut in the milk with the ear,	"	25 "

'It is to be observed that the weight will vary from ripeness, and many other causes, such as wetness of season, shade, thickness of growth, &c.'

In a subsequent number of the Massachusetts Agricultural Repository, was published another elaborate communication from the same pen, from which the following table is extracted.

Table showing the loss of weight in drying grasses.

			1822.	1823.
100 lbs.	of green white clover*	gave	17½	27
100 "	of red† clover,	"	27½	25
100 "	of herd's grass,	"	40	39
100 "	of fresh meadow,	"	38	44
100 "	of salt grass,‡	"	39	60
100 "	of 2d crop, or English rowen,	"	18¾	19

* The white clover of 1822 was taken in the shade; that in 1823, from a light warm soil exposed to the sun.

† The red clover in 1823 was taken in the first year of its product, in close growth, and for that reason falls short of 1822.

‡ The salt grass of 1822 was, I have reason to suppose, a second growth, which accounts for the difference of the two years.

If enabled, experiments will in these cases be hereafter given, so as to fix the result with sufficient accuracy.

		1822.	1823.
100 lbs. of corn stalks,	gave	25	25
100 " of spiked oat grass,	"		50
100 " of red top,	"		46
100 " of Rhode Island,	"		40
100 " of couch grass,	"		48
100 " of marine black grass,	"		38

On Sowing Grass Seeds. A diversity of opinion exists relative to the best time for sowing grass seeds. Some prefer the fall; but the majority of those who have written on the subject recommend sowing in the spring; and that season, so far as our acquaintance extends, is most generally chosen. European writers direct, even when grass seed is sown on the same ground with winter grain, to sow the grass seed in the spring, and *harrow it in.* They say that the harrowing will on the whole be of service to the grain, though a few of the plants will be torn up by the process. The Hon. Richard Peters likewise directed to 'harrow your winter grain in the spring, in the direction of the seed furrows, or drills, and be not afraid of disturbing a few plants; manifold produce will remunerate for the destroyed.'

The *Farmer's Assistant* says, 'Clover may be sown with barley, oats, or spring wheat, when that article is raised; or it may be sown with winter wheat in the fall, if the land be dry and warmly exposed; or in the spring, when it should be lightly harrowed in. The *Domestic Encyclopedia* asserts that 'experienced farmers generally prefer sowing clover with wheat rather than with barley or oats, as in dry seasons the clover frequently overpowers the oats or barley, and if it be sown late in order to obviate this evil, it often fails, and the crop is lost for that season. Probably the diversity of opinion respecting the proper time of sowing clover seed may arise from the difference in the nature of the soil on which trials have been made. An experienced agriculturist, (Edward Duffield, Esq., of Philadelphia county,) assures Dr. Mease that he repeatedly failed in obtaining a crop, when he sowed his clover in autumn or winter; and he is uniformly successful when he sows in the spring. His soil is a light loam.'

On the other hand, an experienced and scientific cultivator, whose suggestions on this subject were published in the New England Farmer, vol. vi. p. 238, dated Weston, and signed J. M. G., says, 'Dear bought experience has taught me the inefficacy of sowing grass seed in spring with grain; it was a custom imported with the ancestors of the country from old England, where the cloudy summers and moist climate will warrant a practice which, under our clear sky and powerful sun, is altogether unsuitable. I must add that grass sown in the fall imperiously requires to be rolled in the spring as soon as the ground is in fit order; otherwise the small plants, slightly rooted yet, and heaved up by the frost, will suffer much, perhaps total destruction; and truly, among the many uses to which the roller may be applied, none, perhaps, would be more valuable than to roll *all* grass lands in spring. The plants suffer from the wind and from the heat, and this being the case more or less every spring, it must necessarily bring on a permature decay, which the yearly use of the roller at that season might prevent.'

We cannot reconcile these authorities; but it is probable that both in fall and spring sowing of grass seeds there may be successful and unfavorable results, according to circumstances of soil, season, &c. Fall sown grass seeds are liable to be winter-killed, or destroyed by frost; spring sown grass seeds may perish by drought and heat. But, whenever sown, there will be less danger either from frost or drought, if the seed is well covered with a harrow, and the ground pressed on it with a roller.

Young's Farmer's Calendar, under the date of August, says, 'This is the best season of the whole year for laying down land to grass; and no other is admissible for it on strong, wet, or heavy soils. Spring sowings with grain may succeed, and do often, but that they are hazardous I know from forty years' experience.'

There is likewise a great difference of opinion as respects the *quantity of seed* to be sown when land is laid down to grass. Sir John Sinclair says, 'It is a great error, in laying land down to grass, to sow an insufficient quantity of seeds. In general, twelve or fourteen pounds of clover is the usual average allowance. But that quantity, it is contended, ought greatly to be increased, and in many cases doubled.' The Farmer's Assistant tells us that 'the quantity of red clover seed to be sown on the acre is about fourteen pounds, and none but clean seed ought to be sown.'

The 'Memoirs of the Board of Agriculture of the State of New York,' vol. ii. p. 30, in giving an account of the methods of culture adopted by farmers in Rensselaer county, state that 'Farmers differ in opinion in regard to the most suitable quantity of seed. S. Germond, H. Worthington, C. Porter, C. R. Colden, and some others, say that eight quarts of the mixture of clover and timothy seed should be sown on every acre. And colonel J. Carpenter sows sixteen quarts on an acre. He says when the grass and clover grow very thick, it will be more tender feed, and more fine hay, and that it will not run out so soon. But J. Phillips, G. Eddy, and many others. consider four quarts as sufficient.

'All agree that the proportions of the mixture of the seeds should be governed by the nature of the soil: that in a sandy soil three-fourths of the seed should be clover; in clay loam it should be equal parts; in clay soil but one-fourth clover seed.

'There should be at least a bushel of plaster sown on every acre of clover and grass land of a sandy, gravelly, or loamy soil. Also on all upland natural meadows. Two bushels per acre are much better than one on sandy or gravelly soil.'

Payson Williams, Esq., of Fitchburg, Massachusetts, who received a premium from the Massachusetts Agricultural society for the greatest quantity of spring wheat, raised by him in the summer of 1822, in giving a description of the mode of culture by him adopted, says, 'The quantity of grass seed used by me is never less than twelve pounds of clover and one peck of herd's grass (timothy) to the acre. Here, permit me to observe, that innumerable are the instances in this country where the farmer fails in his grass crops by not allowing seed enough; and, what is worse, the little he does give with a sparing hand is suffered to take its chance under that pest of agriculture called the bush harrow, which not only drags stones and other loose matters into heaps, but leaves the soil dead and heavy, and does not cover the seed deep enough to strive with our July drought effectually.'

We have, however, been verbally assured by very correct and scientific agriculturists, that six or seven pounds of clover seed, *where the ground is highly manured*, is amply sufficient, and that by exceeding that quantity the plants so shade and stifle each other that there is little substance in the hay made from them. No doubt much depends on the quality and richness of the soil. The poorer the soil the greater the quantity of grass seed. Clover seed of a bright yellow, with a good quantity of the purple and brown colored seed among it, (which shows the maturity of the seed,) should be preferred.

GRAIN. Grain, strictly speaking, signifies seeds, growing in spikes or ears, and includes wheat, rye, barley, oats, &c. Of the culture of these we shall treat under those heads, respectively. We shall here give some directions for improving grain of any sort which has become musty, or sour.

'The wheat [or other grain] must be put into any convenient vessel, capable of containing at least three times the quantity, and the vessel must be subsequently filled with boiling water; the grain should then be occasionally stirred, and the hollow and decayed grains (which will float) may be removed; when the water has become cold, or, in general, when about half an hour has elapsed, it is to be drawn off. It will be proper then to rinse the corn [grain] with cold water, in order to remove any portion of the water which had taken up the must; after which, the corn being completely drained, it is, without loss of time, to be thinly spread on the floor of a kiln, and thoroughly dried, care being taken to stir and to turn it frequently during this part of the process.'—*Code of Agriculture.*

Indian Corn. Indian corn, or maize, as it is sometimes called, is a very important crop. The celebrated English agriculturist, Arthur Young, in speaking of the agriculture of France, observed. 'The line of maize [corn] may be said to be the division between the good husbandry of the south and the bad husbandry of the north of the kingdom; till you meet with maize, very rich soils are fallowed, but never after. Perhaps it is the most important plant that can be introduced into the agriculture of any country, where climate will suit it. The only good husbandry in the kingdom (some small rich districts excepted) arises from the possession and management of this plant. For the inhabitants of a country to live upon that *plant*, which is the preparation for wheat, and at the same time keep their cattle fat upon the leaves of it, is to possess a treasure for which they are indebted to their climate.' The perfect tillage and plentiful manuring requisite for Indian corn make it an excellent substitute for a summer fallow; it is a crop not liable to be injured by too much or too coarse manure; it not only enables, but, as it were, forces the farmer in the course of its culture to subdue his land and exterminate weeds.

Soil. A light loamy soil is best for this crop, and even if sand greatly predominates it will produce good corn with the help of manure. Corn will not flourish on lands in which clay is the chief ingredient, and which are therefore stiff and wet.

Preparation. 'The best preparation for a corn crop is a clover or other grass lay, well covered with a long manure, recently spread, neatly ploughed, and harrowed lengthwise of the furrow. A roller may precede the harrow with advantage. The time of performing these operations depends on the texture of the soil and the quality of the sod. If the first is inclining to clay, or the latter tough, or of long continuance, the ploughing may be performed the preceding autumn; but where sand or gravel greatly preponderate, or the sod is light and tender, it is best performed in the spring, and as near to planting as is convenient. The harrow, at least, should immediately precede planting. All seeds do best when put into the fresh stirred mould. Stiff lands are ameliorated and broken down by fall ploughing; but light lands are rather prejudiced by it. When corn is preceded by a tilled crop, the ground should be furrowed, and the seed deposited in the bottom of the furrows. Where there is a sod, the rows should be superficially marked, and the seed planted on the surface. Where the field is flat, or the sub-soil retentive of moisture, the land should be laid in ridges, that the excess of water which falls may pass off in the furrows.

'*The time of planting* must vary in different districts, and in different seasons. The ground should be sufficiently warmed by vernal heat, to cause a speedy germination. Natural vegetation affords the best guide. My rule has been to plant when the apple is bursting its blossom buds, which has generally been between the 12th and 20th of May.

'*Preparation of the seed.* The enemies to be combated are the wire-worm, brown grub, birds, and squirrels. Of these the first and two last prey upon the kernels, and against these tar offers a complete protection. I soak my seed twelve to twenty hours in *hot* water, in which is dissolved a few ounces of crude saltpetre, and then add (say to eight quarts of seed) half a pint of tar, previously warmed, and diluted with a quart of warm water. The mass is well stirred, the corn taken out, and as much plaster added as will adhere to the grain. This impregnates and partially coats the seed with tar. The experience of years will warrant me in confidently recommending this as a protection for the seed.

'*The manner of planting* is ordinarily in hills from two and a half to six feet apart, according to the variety of corn, the strength of the soil, and the fancy of the cultivator. The usual distance in my neighborhood is three feet. Some, however, plant in drills of one, two, or three rows, by which a greater crop is unquestionably obtained, though the expense of culture is somewhat increased. The quantity of seed should be double, and may be quadruple* what is required to stand. It is well known that a great difference is manifest in the appearance of the plants. Some appear feeble and sickly, which the best nursing will not render productive. The expense of seed, and the labor of pulling up all but three or four of the strongest plants in a hill, it is believed will be amply remunerated by the increased product. If the seed is covered as it should be with mould only, and not too deep, we may at least calculate upon every hill or drill having its requisite number of plants.

'*The after culture* consists in keeping the soil loose and free from weeds, which is ordinarily accomplished by two dressings, and in thinning the plants, which latter may be done the first hoeing, or partially omitted till the last. The practice of ploughing among corn and of making large hills is justly getting into disrepute; for the plough bruises and cuts the roots of the plants, turns up the sod and manure to waste, and renders the crop more liable to suffer by drought. The first dressing should be performed as soon as the size of plants will permit, and the best implement to precede the hoe is the corn harrow, adapted to the width of the rows, which every farmer can make. This will destroy most of the weeds, and pulverize the soil. The second hoeing should be performed before or as soon as the tassels appear, and may be preceded by the corn harrow, a shallow furrow with the plough, or, what is better than either, by the cultivator. A slight earthing is beneficial, provided the

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* Messrs. Pratts, of Madison county, New York, obtained the prodigious crop of one hundred and seventy bushels per acre, and used seven bushels of seed to the acre, the plants being subsequently reduced to the requisite number.

earth is scraped from the surface, and the sod and manure not exposed. It will be found beneficial to run the harrow or cultivator a third and even a fourth time between the rows, to destroy weeds and loosen the surface, particularly if the season is dry.

'*In harvesting the crop*, one of three modes is adopted, viz.: 1. The corn is cut at the surface of the ground when the grain has become glazed or hard upon the outside, put it immediately into stooks, and when sufficiently dried the corn and stalks are separated, and both secured. 2. The tops are taken off when the corn has become glazed, and the grain permitted to remain till October or November upon the butts. Or, 3. Both corn and stalks are left standing till the grain has fully ripened and the latter become dry, when both are secured. There are other modes, such as leaving the butts or entire stalks in the field after the grain is gathered; but these are so wasteful and slovenly as not to merit consideration. The stalks, blades, and tops of corn-if well secured, are an excellent fodder for neat cattle. If cut, or cut and steamed, so that they can be readily masticated, they are superior to hay. Besides, their fertilizing properties as a manure are greatly augmented by being fed out in the cattle yard and imbibing the urine and liquids which always there abound, and which are lost to the farm in ordinary yards, without abundance of dry litter to take them up. By the first of these methods, the crop may be secured before the autumnal rains; the value of the fodder is increased, and the ground is cleared in time for a winter crop of wheat or rye. The second mode impairs the value of the forage, requires more labor, and does not increase the quantity or improve the quality of the grain. The third mode requires the same labor as the first, may improve the quality of the grain, but must inevitably deteriorate the quality of the fodder. The corn cannot be husked too promptly after it is gathered from the field. If permitted to heat the value of the grain is materially impaired.'

To the above directions (which are quoted from an excellent article written by J. Buel, Esq., of Albany, originally published in *The Genessee Farmer*, and republished in the *New England Farmer*, vol. xi. p. 305) we shall add some further particulars from various sources.

A writer for *Goodsell's Genessee Farmer*, with the signature W. P. W., recommends wetting seed corn with soft soap, and rolling it in plaster, and gives the details of an experiment which tested the utility of this practice.

William Clark, Jun,. of Northampton, Massachusetts, published an article on the culture of corn in the New England Farmer, vol. xi. p. 337, giving in detail a number of experiments, which favored the opinion that an equal distance each way is the best method of planting corn; and that on soil 'similar to what I have described, [a sandy loam somewhat exhausted by neglect and severe cropping, manured with about twenty cart loads of compost to the acre] about nine square feet of surface is sufficient ground for one hill.' That is, the hills were three feet apart each way from centre to centre; but he does not state how many kernels were planted, nor how many plants were suffered to remain in a hill.

It has often been stated that great advantage was derived from selecting seed corn from stalks which had borne two or more ears. The Hampshire Gazette, published at Northampton, Massachusetts, mentions a farmer who 'has selected his seed corn in this way for three years past, and the result has exceeded his expectation. He states that it is not uncommon to find in his corn-field this season, [1831] stalks with three, four, five, and sometimes six ears, and three of them fair, full grown, and fit for seed, and that too in hills containing four or five stalks.' He says, 'I think my crop has been increased several bushels this year by the experiment. I would suggest a mode of selecting seed to those who do not cut up the corn at the roots. When they are picking corn, and find a stalk with two or more ears, let them tie the husks together, and the ears will be easily known at husking.'

A solution of copperas in water has been recommended as forming a good preparation for seed corn. Mr. J. Ellsworth, of Ketch Mills, Connecticut, in a communication published in the New England Farmer, vol. x. p. 331, stated as follows:

'Last year I soaked our seed corn in very strong copperas water, as near as I can recollect from twenty-four to thirty-six hours; every kernel was made as black as charcoal; the man who planted the corn called me a fool, and said it would never vegetate. But every hill planted came up well, and during its growth excited the remarks of all who saw it, as being the most even field of corn they ever saw. Not one hill in the whole seven acres was injured by worms; and we had often in previous years been compelled to replant several times, when it had been cut down by the worms.

We had over sixty bushels to the acre.' Copperas water will not preserve corn against the *cut-worm*, which eats off the young plants at or just below the surface of the ground. It has been often asserted, (but we have not known it tested by experiment,) that the kernels of corn from the but-ends of the ears are better for seed than those from any other part of the ear. It is said that the nearer the seed is taken from the largest end, the larger the product. Others recommend to reject some part of both ends, and plant only seeds taken from the middle. Farther experiments are desirable to ascertain these points.

'The following table,' says judge Buel, 'exhibits the difference in product of various methods of planting, and serves also to explain the manner in which large crops of this grain have been obtained. I have assumed in the estimate that each stock produces one ear of corn, and that the ears average one gill of shelled grain. This is estimating the product low; for while I am penning this (October) I find that my largest ears give two gills, and one hundred fair ears half a bushel of shelled corn. The calculation is also predicated on the supposition that there is no deficiency in the number of stocks, a contingency pretty sure on my method of planting.*

	hills.	bush.	qts.
1. An acre in hills four feet apart each way will produce	2722	42	16
2. The same, three feet by three	4840	75	20
3. The same, two by two and a half feet	5808	93	28
	stalks.		
4. The same, in drills at three feet, plants six inches apart in the drills	29,040	113	14
5. The same in do., two rows in a drill, six inches apart, and the plants nine inches, and three feet nine inches from centre of drills, thus: . . . . . . /	30,970	120	31
6. The same in do., three rows in a drill, as above, three feet from centres of drills, thus: . . . . . . / . . . . . . /	43,560	170	5

'The fifth mode I have tried. The ground was highly

* Planting an extra number of plants and thinning them at the first or second hoeing.

manured, the crop twice cleaned, and the entire acre gathered and weighed accurately the same day. The product in ears was one hundred and three bushels, each eighty-four pounds net, and sixty-five pounds over. The last bushel was shelled and measured, which showed a product on the acre of one hundred and eighteen bushels ten quarts. I gathered at the rate of more than one hundred bushels to the acre from four rods planted in the third method, last summer, the result ascertained in the most accurate manner. Corn shrinks about twenty per cent. after it is cribbed. The sixth mode is the one by which the Messrs. Pratts, of Madison county, obtained the prodigious crop of one hundred and seventy bushels per acre. These gentlemen, I am told, are of opinion, that the product of an acre may be increased to two hundred bushels.'

We believe that nearly all the large and premium crops which have been noted in the annals of agriculture, were procured by planting the corn in drills, either single, double, or treble. There has, however, been a difference in opinion relative to planting corn in ridges or on a flat surface. This, we think, depends on the nature of the soil. A loamy soil, or such as is proper for corn, ought, in our climate, to be cultivated in a flat way, that it may the better retain moisture. Dr. Black, of Delaware, advises to plant corn in such a manner that the rows may run directly *north and south.* General Hull, of Newton, Massachusetts, in cultivating a premium crop of corn, 'drew furrows *north and south* three and a half feet apart. No ridges were formed. Hills were then made with the hoe in those furrows two feet apart, *not flat, but descending to the south, with a small bank on the north side of each hill*, for the purpose of giving the young plants a fairer exposure to the sun.

When corn is planted on green sward land, the holes for the hills or drills should be made quite through the furrows, and dung put into the holes. If this caution be not observed the crop will be uneven, as the roots in some places, where the furrows are thickest, will have but little benefit from the rotting of the sward. But if the holes are made through, the roots will be fed with both fixed and putrid air, supplied by the fermentation in the grass roots of the turf.*

Some entertain an idea, that it is injurious to stir the soil when it is dry and the plants are suffering for want of rain. The error of this supposition is well exposed in an article

* Deane's N. E. Farmer.

written by the Hon. J. Lowell, headed, '*Stirring the earth a relief against drought*,' republished from the Massachusetts Agricultural Repository in the New England Farmer, vol. xi. p. 92. The following is an extract:

'In this extraordinary [very dry] season, I had a small patch of early potatoes, planted in a warm and sandy soil, purposely to procure an early crop; the soil was, at least, three-quarters pure sand, mixed with some food for plants among the sand. The severe drought threatened a total loss of the crop. The potato stalks were feeble, drawn up, scarcely larger than goose quills, and I expected every day to see them wither; all hopes of a crop were abandoned. I thought that they were the fair subjects of a *desperate* experiment. On one of the hottest and driest days, I gave them a thorough ploughing, passing the plough four times through each row; first ploughing two furrows from the hills, as near the roots as possible without throwing out the seed potatoes, and then returning the loam or earth instantly back by two other furrows. No rain intervened for ten days. In three days after, the potatoes changed their color, they started afresh as if they had received the benefit of ample showers, while not a drop of rain had fallen.

'The dews, which were abundant, settled upon the new turned earth, while before the ploughing no moisture had been apparent.

'The last fact, though it cannot have escaped the notice of the most careless cultivator, has not been as yet explained. We can easily see that a soil rendered porous would more readily and easily convey its moisture to the roots. It becomes like a sponge, and is readily permeable, or rather readily permits the moisture to pass between the particles. But it is not yet understood why it attracts the moisture. Perhaps, however, it may be owing to its presenting a much greater surface to the moist air of the night. The fact, however, which is what *most concerns us*, is settled. Perhaps some of the experiments of our distinguished countryman Dr. Wells, a physician of London, who rendered himself distingushed by his remarks on dew, may tend to explain this fact, though it is not my purpose to examine the theory.

'Every man who feels an interest in the question can satisfy himself at once by stirring a small piece of earth in a time of severe drought, and if he does not find it in the morning more filled with moisture than the undisturbed ground in its vicinity, let him continue an unbeliever.

'But there is another mode, and it is one which I have never heard suggested, by which I apprehend the stirring of the surface, and making it light and porous, is beneficial in great droughts. It is this: light porous bodies are bad conductors of heat: perhaps because they have more air between their interstices. The facts are familiar to us. Metallic bodies acquire an intense heat under the rays of the sun; so do stones in proportion to their density. The earth, when very compact, will become exceedingly hot, but garden loam, which is very porous, remains cool at noon day two inches below the surface. I believe, therefore, that moving the surface, and keeping it in a light and porous state enables it to *resist the heat of the sun's rays;* that the air between the particles of earth communicates the heat more slowly than the particles themselves do when in close contact.

'Such is my theory, but I am an enemy to theories. I always distrust them; I look only to facts; and having observed that a slight covering of half an inch of sea weed would preserve my strawberries from drought, which can only arise from its lying so loose on the surface, I have been led to infer that the undoubted fact, that soil in a loose pulverized state resists drought, is owing to the same cause, to wit, the slowness with which the heat of the solar rays is communicated to the roots. But, be the theory sound or unsound, I am persuaded that every farmer will find that the free use of his plough and hoe, in times of severe drought, will be of more value to him than as much manure as that labor would purchase. I have always been convinced from my experience as an horticulturist, that the great secret in cultivation consists in making the soil porous. In raising exotic plants we know it to be true, and our flower-pots are always supplied with soil the most porous which we can obtain. The farmer may borrow light from an occupation which he looks upon with disdain, but which serves to elucidate and explain the secrets of vegetation.'

Corn is sometimes profitably planted or sown for fodder. In an *Address to the Essex Agricultural Society*, by the late colonel Pickering, we find the following remarks:

'Every farmer knows how eagerly cattle devour the entire plant of Indian corn in its green state; and land in good condition will produce heavy crops of it. Some years ago, just when the ears were in the milk, I cut close to the ground the plants growing on a measured space, equal as I judged to the average product of the whole piece; and found that, at the same rate, an acre would yield twelve tons of green fodder; probably a richer and more nourishing food than any other known to the husbandman. And this quantity was the growth of less than four months.' * * * 'It has appeared to me that the sort called sweet corn, yields stalks of richer juice than the common yellow corn. It is also more disposed to multiply suckers, an additional recommendation to it, when planted to be cut in a green state for horses and cattle, and especially for milch cows; and the time of planting may be so regulated as to furnish supplies of food just when the pastures usually fail. I am inclined to doubt whether any other green food will afford butter of equal excellence.'

Colonel Pickering recommended planting northern corn in preference to southern corn, when fodder is the object. He observed that 'the green stalks of our northern corn are incomparably sweeter than those of the southern states, at least when both sorts are grown in the north.

Corn intended for fodder may be sowed either broad-cast or in drills. The former is the least trouble, the latter will give the greatest produce, and leave the soil in the best order.

If the land on which you propose to raise your corn is mowing or pasture, fresh ploughed for the purpose, broad-cast sowing will be best, as the sod after being turned over should not be disturbed, and there will not, probably, be much to apprehend from weeds. If you sow broad-cast, from three to three and a half bushels to an acre are recommended, though some say that a larger quantity will be still better. If in drills you will run light furrows about three feet asunder, three or four inches deep, and drop the seed corn in the furrows, about as thick as peas are sown for field cultivation. The seed may be covered with the plough; and a harrow drawn lengthwise of the furrows, followed by a roller, (if you have one,) or perhaps your harrow turned bottom upwards, for want of a roller, will complete the planting. If you mean to dry it for winter use, it will be advisable to sow early in the season, for it will then be fit to cut at a time when it can be most easily cured for preservation in your barn, or other receptacle for fodder.

The following remarks on the culture of corn are from the pen of the Rev. Mr. Colman, of Greenfield, Massachusetts, one of our best practical and scientific farmers.

In the cultivation of this crop, it is in the first place important to secure an early kind, as the best security against backward springs and early frosts. A field of corn in Lexington, planted on the 21st of June, belonging to Mr. Daniel Chandler, yielded an ample crop, and was perfectly ripened. The seed was of the twelve rowed kind, much esteemed there, and easily procured. The kernel is small, but it yields as much to the acre, and weighs more to the bushel, than the eight rowed kind, with a larger kernel. Now a kind of this description, which will ripen in nine or ten weeks, in so unpropitious a season as the last, when there were few warm nights, which are generally considered most important to the forwarding of this crop, is certainly a great acquisition. It will be well to remark here, that it is not only important to procure an early kind, but it will require particular attention to keep it so. Plants, like animals, have a constant tendency to become accommodated to the place and season in which they grow. Indian corn brought from the north to the south will become later and require a longer season for its ripening, unless particular care is taken in the selection of the earliest ripe ears for planting; which is, that high manuring has a tendency, by rendering the growth of a plant more luxuriant and succulent, to retard its ripening and to lengthen its season.

We are satisfied from long observation and experiment that an early planting of corn is generally and strongly to be recommended. The last season, it is true, formed an exception to this rule; but it was a rare case. Now a kind of corn which by early planting and consequently early ripening gives an opportunity of laying down the same ground seasonably with winter grain and clover; or which, where the first plantings will afford us the prospect of a full crop, when the vacancies are not supplied or the planting cannot take place until after the middle of June, certainly is a great object to farmers.

The kind of land best suited to this crop, I am satisfied, is green sward, completely inverted, rolled, and so cultivated as not during the whole season to disturb or break the sod which has been turned over. This is a point of great importance; for the decomposition of the vegetable matter in the ground, which is effectually secured in this way, but entirely lost by the common mode of cultivation, will greatly contribute to the nutriment and vigor of the plant, supplying in fact an amount of manure greatly beyond what any conjectures would have made it, had not an exact experiment determined that in ordinary cases it may be rated over twelve tons of vegetable matter to the acre.

In the next place we protest against the practice of very deep ploughing for this crop, and that of burying the manure deeply under the sod. The depth of ploughing may be in some measure regulated by the nature of the soil; but three or four inches in sward land may be regarded as ample; and not so much as this, where this would carry you below the vegetable mould. All circumstances considered, I am satisfied that it is most eligible to spread the manure upon the surface, ploughing it in with a very light plough and harrow; and though something may be lost in this way by evaporation, yet not so much as burying it under the sod; and the land is left in much better condition for the next crops where the manure is thus spread, than where it is placed in the hill; nor is the corn so like to suffer from the drought, and the saving is considerable.

NEAT CATTLE. Neat cattle form a very important part of every farmer's live stock. In selecting them, two things are very material: first, the health and soundness of the stock from which they are purchased; and secondly, the quality of the soil on the produce of which it is intended to feed them. Stock for the dairy or the butcher should be selected from a breed of which you know or can ascertain every particular relative to their general health and soundness, and the manner in which they have been reared, including their food, shelter, &c.

The Farmer's and Grazier's Complete Guide, by B. Lawrence, an English writer, observes, 'Much has been written as to what breeds are the best; and a considerable greater stress has been laid on this part of the question than is borne out by any positive result; there are good and bad of all kinds; and provided you select sound and healthy animals from warranted stock, you will, if you treat them properly, have little to care for and less to fear.

'Always purchase cattle that have been fed on lands of a *poorer* quality than your own; but you must not too suddenly put them to the richer food, or they will be liable to several dangerous diseases. It rarely happens, however, that cattle purchased from rich lands thrive well on poor soils; but, on the contrary, those from poorer farms do well on good land. The choice of neat cattle, therefore, for the stocking of farms, must, in a great degree, be regulated by the nature and quality of the soil intended to feed them on.

'It is also essential that the cattle should be young, as well as healthy and of sound constitution; for the younger they are, the more likely they will be to do service. Their age may easily be known by the teeth; like sheep, they have no fore teeth in the upper jaw; it is in the lower, therefore, by which this must be determined: the horns also afford some guide in this respect.

'The eight fore teeth of the lower jaw are shed, and replaced by others which continue through life: the two middle fore teeth fall out at about two years old, and are succeeded by others not so white. At three years old they have two more next to those of the previous year; and thus by the two succeeding years all the fore teeth are renewed; they are then termed full mouthed, and are five years old. At the sixth year the row is even, the last two being completely up. Besides these they have ten grinders in each jaw.

'At the age of three years the horns are smooth and even; in the course of the fourth year, a wrinkle or circle forms round the basis of the horn near the head; this is every year succeeded by another, which always seems to move the other forward. At looking therefore at the horns of neat cattle, if the first circle be considered as three years, it will be an easy task to tell the age of the beast at any subsequent period. An implicit reliance cannot, however, be placed on these marks, particularly in purchasing of strangers, or cow jobbers, such persons having been known to file down some of the animal's teeth and alter the appearance of the horns so as to give them the semblance and marks of young cattle of the most valuable breeds, and pass them off as such to strangers.'

Cows for the Dairy. In selecting cows for the dairy, the following indications should be attended to. Wide horns, a thin head and neck, dew-lap large, full breast, broad back, large deep belly; the udder capacious but not too fleshy; the milch veins prominent, and the bag tending far behind; teats long and large; buttocks broad and fleshy; tail long, pliable, and small in proportion to the size of the carcass, and the joints short. The Alderney breed gives a very rich milk. The Durham short horns, however, exceed them as respects quantity; and we have the testimony of the Hon.

Levi Lincoln, late governor of Massachusetts, that the milk of Denton's progeny, a branch of that race, is not only abundant, but of excellent quality.*

Cows should be milked regularly morning and evening, and as nearly as may be at the same hours. At six in the morning and six at night is a good general rule, as the times of milking will be equi-distant from each other. But if they are milked three times a day, as Dr. Anderson recommended, the times may be five, one, and eight. He asserted that if cows were full fed, they will give half as much again if milked three times as if only twice. At the same time, it would prevent too great a distension of their bags, to which the best cows are liable.

The cow which is desired to remain in perfection, either for milking or breeding, should not be exhausted by drawing her milk too long after she becomes heavy with calf. It is paying too dear for a present supply of milk. She should be suffered to go dry at least two months before calving.

The expense of keeping cows of a poor breed is as great and sometimes greater than that of keeping the best. If cows are poorly kept the difference of breeds will scarcely be discernible by the product of their milk. Some have therefore supposed that it is the food alone which makes the odds in the quantity and quality of the milk. This supposition is very erroneous, as may be shown by feeding two cows of a similar age, size, &c. on the same food, the one of a good breed for milk and the other of a different kind, and observing the difference in the milk product. No farmer, unless he is very rich, can afford to keep poor milch cows. He might almost as well keep a breed of 'naked sheep,' such as Swift mentions in Gulliver's Travels. The farmer who raises a heifer calf that is from a poor milker, or of a breed of little value, is as foolish as he would be if in clearing land he should burn on the ground the birch, maple, and walnut, and save white pine and hemlock for fire wood. And yet many sell the calves of the best milch cows to the butchers, because such calves are fattest!

Those cows which give the greatest quantity of thin milk are most profitable for suckling calves, for rich milk is said not to be so proper food for calves as milk which is less valuable for dairy purposes. Milk which contains a large proportion of cream is apt to clog the stomachs of calves;

* See N. E. Farmer, vol. iv. p. 318.

obstruction puts a stop to their thriving, and sometimes proves fatal. For this reason it is best that calves should be fed with the milk which first comes from the cow, which is not so rich as that which is last drawn.

Mr. Russel Woodward, in the *Memoirs of the New York Board of Agriculture*, says, 'I have found that young cows, the first year that they give milk, may be made with careful milking and good keeping to give milk almost any length of time required. But if they are left to dry up early in the fall, they will be sure to dry up of their milk each succeeding year, if they have a calf near the same season of the year; and nothing but extraordinary keeping will prevent it, and that but for a short time. I have had them dried up of their milk in August, and could not by any means make them give milk much beyond that time in any succeeding years.'*

A writer in the *Bath and West of England Society's Papers*, states that if at any time a good milch cow should go dry before her milk is gone, get a young calf and put it to her in order to preserve her milk against another year; for it is well known, if a cow goes dry one year, nature will lose its power of acting in future.

Cows should be treated with great gentleness and soothed by mild usages, especially when young and ticklish, or when the paps are tender; in which case the udder ought to be fomented with warm water before milking and touched with great gentleness, otherwise the cow will be in great danger of contracting bad habits, becoming stubborn and unruly, and retaining her milk ever after. A cow never gives down her milk pleasantly to a person she dreads or dislikes. The udder and paps should be washed with warm water before milking, and care should be taken that none of the water be admitted into the milking pail.

The keeping of cows in such a manner as to make them give the greatest quantity of milk, and with the greatest clear profit, is an essential point of economy. Give a cow half a bushel of turnips, carrots, or other good roots per day, during the six winter months, besides her hay, and if her summer feed be such as it should be, she will give nearly double the quantity of milk she would afford if only kept

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* I have two cows now that were milked the first year they had calves till near the time of their calving again, and have continued to give milk as late ever since if we will milk them.'

during the winter in the usual manner; and the milk will be richer and of better quality.

The carrots or other roots, at nineteen cents a bushel, amount to about eighteen dollars; the addition of milk, allowing it to be only three quarts a day for three hundred days, at three cents a quart, twenty-seven dollars. It should be remembered, too, that when cows are thus fed with roots they consume less hay, and are less liable to several diseases, which are usually the effects of poor keeping.*

The keeping of cows is very profitable. Allowing one to give only six quarts a day, for forty weeks in each year, and this is not a large allowance, her milk at two cents per quart will amount to upwards of thirty-three dollars; which is probably sufficient to purchase her and pay for a year's keeping.*

'A farmer some years since kept eighteen cows on a common, and was often obliged to buy butter for his family. The common was inclosed, and the same person supplied his family amply with milk and butter from the produce of four cows well kept.

'Great milkers seldom carry much flesh on their bones, but they pay as they go and never retire in our debt. The difficulties in cow keeping are these: the expense of their food is considerable, more especially with respect to any which must be purchased, and if the produce be inconsiderable it may be a losing concern. You may be feeding a sparing milker into flesh, and if you stint her or allow her only ordinary food you get neither flesh nor milk.'†

Amateurs in this line should procure the largest milkers, and I had almost said give them gold, could they eat it. In this case it may be depended on, *milk is always of more value than the best cow-food;* and a cow, the natural tendency of which is to breed milk, will convert all nourishment, however dry and substantial, into that fluid; in fact will require such solid kind of nourishment to support her strength and induce her to take the bull.†

Keep no more cows than you can keep well; one cow well fed will produce as much milk as two indifferently treated, and more butter; and if the cow be wintered badly, she will rarely recover, during the succeeding summer, so as to become profitable to the feeder. Cows should by all means be housed in extreme weather, and particularly those which

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* Farmer's Assistant. † Mowbray on Poultry, &c.

give milk, or a failure in the quantity of milk will be experienced. Wherefore, instead of keeping twenty cows poorly fed and but half of them stabled, sell ten and give the remaining ten food in amount equal to what the twenty originally had; procure constant stabling for them, and you will receive quite as much milk and butter in return as was derived from the former mode of treating twenty. Sweet potatoes, carrots, pumpkins, and ground oats, are unquestionably among the best articles for food for milch cattle; and they occasion the milk and butter to assume a fine flavor and color, as well as increase of quantity.*

Winter food for Cows. Mr. Chabert, the director of the veterinary schools of Alfort, had a number of cows which yielded very great quantities of milk. In his publications on the subject he observed that cows fed in winter on dry substances give less milk than those which are kept on a green diet, and also that their milk loses much of its quality. He published the following receipt, by the use of which his cows afforded him an equal quantity and quality of milk during the winter as during the summer. Take a bushel of potatoes, break them while raw, place them in a barrel standing up, putting in successively a layer of potatoes and a layer of bran, and a small quantity of yeast in the middle of the mass, which is to be left thus to ferment during a whole week, and when the vinous taste has pervaded the whole mixture, it is then given to the cows, who eat it greedily.

Pure water is an essential article for cows. Dr. Anderson says he knew a man who acquired great wealth by attention to things of this nature, and one of his principal discoveries was the importance of having a continued supply of the purest water which could be obtained for his cows, and he would on no account permit a single animal to set his foot in it, nor allow it to be tainted even by the breath of animals.

Parsnips cause cows to give milk in abundance, and that of the best quality.

Working Cows. An English cultivator, whose observations are published in the appendix to *Plymley's Survey of Shropshire*, says, 'Cows are fattened easier and are better laborers than oxen. The uses of cattle are to work, milk, and fatten. I have seen barren cows work as well as oxen;

* Trenton Emporium.

they require less keep and walk faster. When first I commenced farmer, I followed the example of my predecessor in feeding chiefly oxen; but I soon found that cows fattened much faster, and on less meal, and for some years past I have carefully avoided having any oxen in my stalls.'

Cows which are shortly expected to calve ought to be lodged at night in some convenient place under cover for a week or two before calving, as it might be the means of saving the life of the calf, and perhaps of the dam likewise. The day and night after a cow has calved she should be kept under cover, and her drink should be lukewarm. Let her not be exposed for some time to the dampness of the night.

Cows which are near calving ought to be fed with better and more substantial food than usual. Grain of any kind is now useful, but it should be crushed, bruised, or coarsely ground. If the cleaning of a cow after calving be delayed, it may be promoted, according to Deane's New England Farmer, by giving her a pail of warm water with some ashes in it; or, according to the Grazier's Guide, the only thing to be given is toast and weak wine, or good cider or perry. If wine be preferred, mix it with an equal quantity of water. This toast should consist of four pints of wine and water, and about a pound and a half of bread toasted.

Inflamed teats should be washed with two drachms of sugar of lead in a quart of water. Should tumors appear, apply a common warm mash of bran with a little lard.

To prevent cows from sucking their own milk, it is said that rubbing the teats frequently with the most fetid cheese that can be procured is an effectual remedy.

In order that it may be ascertained what is the proper time for cows to go dry previous to their calving, an account should be kept of the time when each cow is put to bull, so that the cow may be dried off in due season. The following prescription for drying off cows is given in *Monk's Agricultural Dictionary.*

Take an ounce of powdered alum; boil it in two quarts of milk till it turns to whey; then take a large handful of sage, and boil it in the whey till you reduce it to one quart; rub her udder with a little of it, and give her the rest by way of drink; milk her clean before you give it to her; and as you see need repeat it. Draw a little milk from her every second or third day, lest her udder be overcharged.

Cow-house or Stable. The floor under a cow-house should be very tight, so that none of the stale may be lost, which, when mixed with other substances, is of great value as manure. The most healthy stables are those which are open to the east, or have an eastern aspect. It is a common practice to build them too close. The stable should never be completely closed up, however cold the weather may be, although it is desirable that strong draughts of cold or damp air should be guarded against, especially in winter. It may be held as a general rule that stables or cow-houses are too close when on entering the breath is affected, or any smell of urine can be perceived.

It is also very important to keep cow-houses or cattle stables clean and well littered. Dung left in stables soon renders the air unwholesome, and is the cause of disorders. Cows in a stable should be allowed a square space of at least six feet each way for each cow. Two or three ventilators near the ground on the north side afford, at a trifling expense, an excellent way of renewing or sweetening the air in stables in the summer time, and on the south side in winter, without occasioning draughts; and these may be shut when necessary by means of straw, or, what is better, a sliding door.

It is of no small importance that the floor of a cow-house be very tight, so that none of the stale be lost, which is of great value as manure, when mixed with other substances. A farmer might as well lose the dung as the urine of his beasts.

'The common cattle stalls of our country are so ill contrived, and so straitened in their dimensions, that the cattle are constrained to lie down in part in their own dung. This dries and forms a thick coat on their hind quarters, from which they are not relieved till they shed their hair in the spring. They are thus rendered *uncomfortable.* To be uncomfortable is to suffer some degree of *pain;* and no one will suppose that animals in *pain* can *thrive*, or preserve their plight with the same food equally with others perfectly at ease. Even hogs, though prone to wallow in the mire in warm weather, are always pleased with a dry bed, and thrive best when kept clean.'*

The following, from the Memoir's of the Pennsylvania Agricultural Society, is extracted from a letter from R. Smith to J. H. Powel, and will be of use in directing the most economical management of dairy cattle.

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* Colonel Pickering.

My barn is constructed according to the best Pennsylvania models. The yard is to the south of it. On the east and west sides are cow stables, containing one hundred and ten well made stalls, ventilated by a sufficient number of windows and double doors. At the tails of each range of cows there is a drain made of strong planks, and so fixed as to receive all their dung and urine. These several drains have a sufficient declivity to carry all the fluid matter to their southern terminations, where they intersect similar drains, which convey all this liquid manure into a cistern, fifty feet long. This cistern is so placed and constructed as to receive not only the urine of the stables, but also the liquid matter of the farm-yard. In it there is a pump, by means of which its contents are pumped into a large hogshead, fixed on a pair of wheels drawn by oxen. To the end of this hogshead is attached a box pierced with holes, into which this liquid manure floats through a spigot and faucet, and is then sprinkled over the ground as the oxen move forward.

Food for fatting Cattle, keeping Stock, &c. It has been often said, and we believe correctly, that it is not profitable, generally speaking, to fatten cattle on any kind of grain. Lawrence on Neat Cattle asserts that 'corn [by which is meant oats, barley, rye, peas, beans, wheat, &c.] cannot be used in the fattening of bullocks and sheep, except in seasons of superabundant plenty. Even Indian corn is often too costly food to be used solely, or principally, for the profitable fattening of cattle; and grass, hay, and roots are the materials which true economy requires.'* It is, however, asserted, that beef fattened on oil cake, raw potatoes, turnips, &c., will not be so firm, nor of so good a quality, other things being equal, as that which is fattened on Indian corn. If that be true, it might be well to commence feeding with turnips, potatoes, &c., and give the animals richer food as they increase in fatness.

An able writer says, 'With respect to feeding, the first rule is, little at a time, and often; because experience has shown that animals that eat much in a short time do not fatten so well as those which eat less but more frequently. The second rule is to begin the course with cabbage and turnips, then to employ carrots and potatoes, and lastly Indian, oat, or barley meal. These aliments ought to be varied several times a day, and oftener if convenient; and instead of always

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* See a communication for the N. E. Farmer, vol. i. p. 234.

reducing them to a meal, there is advantage in sometimes boiling them. A little salt given daily is very useful.'

It would be advantageous to the community of farmers if something like the following experiments were made, and their results published. Let a number of cattle of similar or the same breed, age, propensity to fatten, as ascertained by handling, &c., be fattened at the same time. Let one be fed entirely on potatoes raw; a second on the same root steamed or boiled; a third made one-half or two-thirds fat on potatoes, and his fattening completed with Indian corn; a fourth be fattened on Indian corn, or corn meal; a fifth be fed with a mixture of all these kinds of food, given together in the same mess, or in different messes. The first food in the morning, for the last-mentioned bullock, might be a small quantity of potatoes, pumpkins, or turnips; the second, ruta baga or carrots, mangel-wurzel, or parsnips. Then, as the last course of the day's feast, give Indian meal, or other food the richest you have. It would be well, likewise, to try the virtues of sweet apples. The most important object of such experiments, however, would be to ascertain whether the beef of cattle fattened on potatoes or other roots, raw or boiled or steamed, is *equal in quality* to that which is fattened on Indian corn. If not, whether an ox may not be made nearly fat enough for profit on roots and hay, his fatting completed on corn, and the flesh be as good as if he had been fattened wholly on corn. And if an ox partly fattened on roots, and his fattening completed on corn, gives as good beef as one wholly fed on corn, the question occurs, *how long a time* will it require to give the beef its good qualities arising from the corn? We know, as respects swine, that farmers make them partly fat on any thing which they will devour, and then feed them for some time before they are killed with Indian corn or meal, to '*harden the flesh*,' as they express it; and perhaps the same process will answer for beef cattle. Some farmers say that the red or La Plata potato, given raw to swine, make as good pork as that which is corn fed. Others say that any kind of potatoes, if steamed or boiled, will make as good pork as can be made of corn. If this be true of pork, it may be so of beef.

It is a truth which has been confirmed by repeated experiment, that food for *swine* fermented till it becomes a little acid will go farther and fatten them faster than unfermented food of the same quantity and quality. But it is not, I believe, generally known in this country, that *acid food* is most valuable for neat cattle in certain circumstances. Mr. Bordley, (a celebrated American writer on Rural Economy,) however, asserts that oxen made half fat, or in good plight, on grass or turnips, are then finished, in France, upon a *sour* food, prepared as follows: *rye meal* (buck wheat or Indian meal may be tried) with water is made into *paste*, which in a few days *ferments* and becomes sour; this is then diluted with water, and *thickened with hay*, cut into chaff, which the oxen sometimes refuse the first day, but when dry they drink and prefer it. All the husbandmen are decidedly of opinion that they fatten much better because of the *acidity*. They give it thrice a day, and a large ox eats twenty-two pounds a day. Maize [Indian] meal, or maize steeped till it is sour, should be tried. This sour mess is given during the last three weeks of their fattening, and they eat about seven and a half bushels of meal, value four dollars.

Care should be taken that the process of fermentation be not carried too far. The paste should not become mouldy, nor the liquid food in the slightest degree putrid. We think, moreover, that there is good reason for waiting till animals become 'half fat,' or in good plight, before they are fed with acid food. Acids, like alcohol, create appetite by stimulating the stomach, but if long continued they weaken the digestive powers, and in time entirely destroy the tone of the stomach. The animal will then be visited with what in a human subject would be called dyspepsia, or a want of the power of digestion; fattening him will be out of the question, and he will be worth but little more than the value of his hide. The constitution of an ox may be destroyed by excessive eating, and it is only towards the close of his days, near the last stage of his preparation for the butcher, that he should be allowed to become an epicure, and indulged with as much as he can eat of rich and high seasoned food.

Store keep should neither be too rich nor too abundant; and if an ox is once made fat and then loses his flesh, he is like one of Pharaoh's lean kine, the more he devours the leaner he becomes. If young cattle are kept in rich pastures in summer and poor fodder in winter, sometimes stuffed, at other times starved, they lose their disposition to fatten. To such cattle Mr. Lawrence alludes, when he says, 'It is extremely imprudent indolently to continue to keep at high food animals which do not thrive; I advert chiefly to individuals with which the first loss is always the least.' 'Stock cattle,' said Mr. Bordley, 'are *kept*, others are fattened. The feeding is different. Cattle kept need no kind of grain, nor even *hay*, unless to cows about calving time. Straw, with any juicy food, such as roots or *drank*,* abundantly suffice for keeping cattle in heart through the winter, provided they are sheltered from cold rains. Mr. Bakewell kept his fine cattle on straw and turnips through the winter. A *drank* for *keeping* cattle may be made thus: roots, chaff, or cut straw, and salt, boiled together with a good quantity of water; the roots cut or mashed. The cattle drink the water and eat the rest. Drank for *fattening* cattle, thus: roots, meal, flax-seed, chaff, or cut straw, and salt, well boiled together in plenty of water. If given warm, not hot, the better.' The same author says, 'Hay, meal, and linseed jelly with drank must be excellent food in stall feeding. Linseed jelly is thus made: seven quarts of water to one of flax-seed, steeped in a part of the water forty-eight hours, then add the remaining water, cold, and boil it gently two hours, stirring constantly to prevent burning. It is cooled in tubs, and given mixed with any meal, bran, or cut chaff. Each bullock (large) has two quarts of *jelly* a day; equal to a little more than *one quart of seed in four days*.'

In a tract entitled *Notices for a Young Farmer*, written by the Hon. Judge Peters, formerly president of the Pennsylvania Agricultural society, are the following directions: 'Cut or chaff your hay, straw, corn tops, or blades, and even your stalks, with a straw cutter, and you will save a great proportion which is otherwise wasted or passed through the animal without contributing to its nourishment. One bushel of chaffed hay at a mess, given in a trough, three times in twenty-four hours, is sufficient for a horse, ox, or cow. A bushel of chaffed hay, lightly pressed, weighs from five to five and a half pounds. A horse or horned beast thrives more on fifteen pounds thus given than on twenty-four or twenty-five pounds as commonly expended (including waste) in the usual manner of feeding in racks; to which troughs, properly constructed, are far preferable.† Salt your clover and other succulent, as well as coarse hay. But over salting diminishes the nutriment. More than a peck to a ton is superfluous. Half that quantity is often sufficient. Ten or fifteen pounds is usually an ample allowance. Feed-

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* The word *drank* is given us by count Rumford for distinguishing this composition from water.

† See farther, Straw Cutter, under the head Agricultural Implements.

ing your stock by weight and measure of food will not only save your provender, by its orderly distribution, but frequently save the lives of animals, too often starved by niggardliness or neglect, or gorged and destroyed by profusion. If it be true, as it is, that the master's eye makes the horse fat, 'it is equally so that the master's eye prevents the horse from being pampered, wanton, pursive, bloated, foundered, and finally wind broken and blind.'

If hay is salted by using salt in substance, it should be done at the time it is deposited in the mow. It is often a good practice to sprinkle a solution of salt in water over hay or other food for cattle in the winter time, especially if the fodder be of an inferior quality.

Colonel Jaques, of Ten Hills farm, Charlestown, (Mass.) has been very successful in the breeding and rearing of neat cattle, and recommends from actual experiment the following mixture:

Take Ruta Baga, cut fine,	2 bushels.
" Wheat bran,	1 bushel.
" Powdered oil cake,	½ bushel.
" English hay, barley straw, and salt hay, *cut*, of each,	7 bushels.
" Water,	10 gallons.

Let them be perfectly mixed. Give a bushel of the mixture to a cow of the common size every night and morning, and proportionably to greater or smaller animals.

On soiling laboring Oxen and Horses. By *soiling* domestic animals, is meant keeping them in yards, &c., and cutting and giving them grass, with or without other green or dry food. Instead of turning your oxen and horses, which you have occasion to use frequently, into a pasture, perhaps adorned with thickets of brushwood, in which the animals may hide themselves beyond the reach of a search warrant, you had better *soil them*, and thus have them always at hand. You must be careful that they are always well supplied with water, and plenty of litter to absorb the liquid manure, unless you have reservoirs, &c. to answer the purpose of preventing its waste. The famous cultivator Arthur Young observed that lucerne is the best plant for soiling, and an acre of it will go farther than any thing else. But clover or any other grass, green or dry, butts of Indian corn cut up near the roots, cabbages, &c., &c., may often be economically disposed of in soiling cattle or horses whose services are requisite for the daily and hourly labors of the husbandman. But soiling on a large or general plan will not soon, if ever, be adopted in New England, where there are so many thousands of acres of pasture land which are fit for nothing but grazing.

Cooking Food for Cattle. Among the most useful improvements of modern husbandry, may be numbered the practice of steaming or boiling food for domestic animals. Some account of the origin of this practice in Great Britain may be found in the *Complete Grazier*, an English work of reputation, from which we have made the following extracts.

'Steamed food may be given to milch cows to great advantage. For this important fact in rural economy we are indebted to the ingenious and persevering experiments of J. C. Curwin, Esq., M. P., whose attention to the comforts of his tenants, and judicious zeal for the improvement of agriculture, are too well known to require any eulogy. In prosecution of a system which he had long practised of giving cooked food to animals, Mr. Curwin turned his attention to the cheapest mode of supplying milch cows with it; and in a communication to the society for the Encouragement of Arts, &c., (which was honored with their lesser gold medal,) he stated his belief that he has at length been completely successful. He uses a steam boiler of 100 gallons' contents,* on each side of which are fixed three boxes, containing eleven stones† each of chaff, (the husks of wheat, rye, &c.,) which by being steamed gain more than one-third of their original weight. The steam is conveyed by various cocks into the lower part of the boxes; and thus two or three boxes may be steamed at the same time. The quantity of fuel required was about two pounds for each stone of chaff.

'In giving the steamed chaff to the cattle, two pounds of oil cake were mixed with one stone of chaff; and the milch cows are fed with it morning and evening, having an allowance of one stone at each time. On being taken from the steamer the food is put into wooden boxes, which are mounted on wheels, to be drawn to the place where it is intended to be used; and the chaff requires to stand some time before it is fit for use.

'The average milk on a stock of thirty-six milch cows was

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* An engraving of it is given in the thirtieth volume of the society's Transactions.

† Fourteen pounds a stone.

nearly thirteen wine quarts for 320 days. The cows were never suffered to be turned out; and to prevent their being lame, their hoofs were properly pared, and they stood with their fore feet on clay. One great advantage attending this method was, that most if not all the milch cows were in such a condition, that with a few weeks' feeding, after they were dry, they became fit for the shambles, with very little loss from the first cost. As a substitute for chaff and oil cake, Mr. Curwin recommends cut hay; which, when steamed, would make very superior food, and he entertains no doubt would greatly augment the milk as well as the health of the animals.'

An apparatus for steaming food for cattle should be considered a necessary appendage of every arable and dairy farm of a moderate size. The advantage of preparing different sorts of roots, as well as even grain, chaff, and hay, by means of steaming apparatus, for the nourishment of cattle, begins now to be generally understood. It has been long known that many sorts of roots, and particularly the potato, become much more valuable by undergoing this sort of preparation. And it is equally well known that when thus prepared they have been employed alone as a substitute for grain, with cut chaff for hay and grain, in the feeding of horses as well as other animals. To a farmer who keeps horses or cattle, or even swine or poultry, the practice of boiling their food in steam is so great a saving and advantage, that it deserves the most particular attention. Though potatoes have often been given raw both to horses and cattle, they are found to be greatly preferable when cooked by steam, as they are thereby rendered much drier and more nutritive, and better than when boiled in water; this has been long since shown by the experiments of Wakefield, of Liverpool, who, in order to ascertain it, fed some of his horses on steamed and some on raw potatoes, and soon found the horses fed on the steamed potatoes had greatly the advantage in every respect. Those fed on steamed potatoes looked perfectly smooth and sleek, while the others were quite rough.

A steaming machine on a simple and economical plan consists of a boiler, and a wooden chest or box, placed over or near it. The box may be of any size, and so placed as to be supplied and emptied by wheel or hand barrows in the easiest manner, either by the end or top, or both, being made to open. If the box is made eight feet by five, and three feet deep, it will hold as many potatoes as will feed fifty cows for twenty-four hours, and these may be steamed in an hour.*

The practice of cooking food for cattle is by no means a novelty in New England. A simple apparatus for this purpose much used is as follows:

A kettle, holding twelve gallons or more, is set in a furnace of brick or stone, and over this a hogshead with one head taken out and the other bored full of holes. This is set so close that the steam of the kettle, when boiling, can only rise through the holes, and thence ascend among the articles to be boiled in the hogshead, and pass off at the top. In this way a hogshead of potatoes will be nearly as soon boiled as a small part of them could be if placed in the kettle underneath.

As the kettle is so closed as to prevent any steam from passing off but through the bottom of the hogshead, a pipe or tube is set in such a manner that with the aid of a funnel water may be poured into the kettle as often as is necessary. After the water is poured in, the tube is stopped with a plug for that purpose.

Grain of all kinds may be steam boiled to great advantage for feeding and fattening cattle; but in that case it is requisite to have the bottom of the hogshead covered with a cloth, to prevent the grain from running down through the holes.

In the fifth volume of the N. E. Farmer, p. 306, are some notices of the use made of steam in preparing food for cattle, in a letter from R. Smith, Esq., president of the Maryland Agricultural society, on the management of dairy cattle, &c., to John Hare Powel, Esq.

'For the purpose of augmenting the quantity and improving the quality of the food of my stock of every kind, I have established a steaming apparatus. It consists of a boiler and two wooden boxes, in which boxes is steamed the food. These boxes contain each eighty bushels. By this simple apparatus every species of coarse vegetable offal is converted into nourishing food, and all the ordinary provender is rendered more nutritious.

'In the dairies near Philadelphia, it is well known, that sweet butter of the first quality cannot be made but from cream *quickly* produced from *fresh* milk, and that whenever the milk remains many days to produce its cream, such

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* For a simple apparatus for steaming food for cattle and swine, see a cut under the head Agricultural Implements.

cream acquires an unpleasant taste that is imparted to the butter.

'Since the month of January, 1823, my dairy people have been in the practice of always placing the pans containing the milk in water simmering hot. The oily parts which constitute the cream are by such heat separated from the other ingredients, and then, from their specific lightness, they of course ascend to the top in the form of cream. Cream is thus obtained during the coldest weather in winter in the course of about twelve hours after the milk has been taken from the cows. And the operation of churning such cream never exceeds twenty-five minutes. The milk pans remain in the hot water about thirty minutes. The butter has invariably been of a fine flavor, and of a beautiful yellow color; and, in the nature of things, it never can be otherwise, unless the dairy woman should be utterly ignorant of the art of making sweet butter.

'It may not be amiss to state to you that the skim-milk under this process is a very pleasant beverage. In summer and winter it bears the agitation of a carriage without becoming sour. And every morning through the year a person comes to the farm and takes from 250 to 300 quarts, for which he pays two cents per quart, cash, and on the same day he retails the whole among the people of the town, at three cents per quart.

'The hot water in which the milk pans are placed is contained in large flat wooden vessels, attached to a stove. The water is heated by means of a flat tube fastened to the side, and near to the bottom of each vessel, and introduced through an aperture into the stove. The heat of the stove affords the additional advantage of preserving in the dairy house the requisite temperature during the winter season.

'The dairy house is a stone building, consisting of three spacious apartments for the preservation of the milk, the cream, and the butter, and for the making of the butter. Two of these apartments are under ground and arched, and properly ventilated. To the south side is attached a convenient shed, with the requisite shelves, and with a copper boiler for washing and keeping in good and sweet condition all the dairy utensils. In front is a pent house.'

Jesse Buel, Esq., recommends using a boiler instead of a wooden vessel for cooking food for swine. He observes, 'I have thrown by my steamer for hog food and substituted a boiler. The former consisted of a sixty gallon cask, over a potash kettle badly set. I could only work off four or five casks a day, with great labor and trouble, and the apparatus required to be luted with clay at every operation. With my new kettle, holding thirty gallons, which is a thin and beautiful casting, I have cooked eight and nine barrels in half a day, and much better than by the steam process. This food consists of small refuse potatoes, of which I have nearly 100 bushels, or fifteen per cent of my whole crop, pumpkins, and a small quantity of Indian meal. A half day's boiling serves my hog family for four or five days; and it is always kept prepared in advance. The actual expense of fattening hogs thus, upon the refuse of the farm crop, is fifty to seventy-five per cent. less than feeding with dry corn.

'The economy of my apparatus consists much in setting the boiler so as to have all the advantage of the fire. The interior brick work is made to conform to the shape of the boiler, leaving an interval of four to six inches between them for the fire, round the whole exterior of the kettle, with the exception of a few inches at top, where the flange or rim rests upon the projecting bricks. Thus the boiler is not only encompassed by the flame, but the heat is augmented by radiation from the brick work. The fuel is burnt on a grate, which extends nearly to the kettle, four or five inches above the level of its bottom. My boiler being in operation while I am preparing these remarks, I have ascertained that a kettle of potatoes with three pails of cold water, covered with boards, has been completely boiled in eighteen minutes from the time they were put in, another boiling having been just previously taken out. My kettle was set by a son in his teens, without assistance, and was his first effort in masonry.'

In cooking for cattle, however, when hay and other bulky articles of food are prepared by heat, steam will be found the best medium. Care should be taken to make the vessel in which the steaming is effected so tight that the steam cannot escape till it becomes quite hot and elastic. A cover of good weight sitting close, but capable of being raised a little by steam of high pressure, may be made to operate like a safety valve, and at the same time confine the steam till it exceeds 212 degrees, the heat of boiling water. Any food is better when cooked by steam of a high temperature, than when merely soaked in an artificial fog, not much warmer than a mist which caps the hills on a summer's morning.

CALVES. *Calves* designed for veal should be taken from the cow the next day after they are calved. They should be permitted to suck only two teats during the first week, three during the second, and should have the whole of the milk the third and fourth week, at the end of which time they will be fit to kill. The teats not allowed to be sucked should be previously milked.

When calves are to be reared, some permit them to run with the cow, and take all the milk the first season. But fine animals are raised without taking any milk from the cow after three or four days. They should have more or less milk for about twelve weeks. They may be fed with skimmed milk or water gruel after the first fortnight; or hay tea may be mixed with their milk, or their milk may be mixed with meal and water. After a calf has sucked or drank milk for the space of a month, take some fresh and sweet hay, and put small locks of it into cleft sticks, in such a manner that the calf can easily have access to them, and he will soon learn to eat hay.

Whether calves are intended to be fattened or to be reared, it is best to feed them three times a day. But whether they are fed two or three times, the intervals between their meals should be regular, and as nearly as possible equi-distant.

The method for rearing calves pursued by Mr. Crook, as mentioned in '*The Letters and Papers of the Bath and West of England Society*,' is as follows: He purchased three sacks of linseed, value 2*l*. 2*s*., (equal to about nine dollars,) which lasted him three years. One quart of seed was boiled in six quarts of water for ten minutes, to a jelly, which was given to the calves three times a day mixed with a little hay tea. And he states that his calves throve much better than those of his neighbors, which were fed with milk. Thus it seems that less than eighteen cents' worth of flax-seed, with a trifle of hay, is sufficient for one calf. Linseed oil cakes, when pulverized and boiled, make an equally good broth or jelly.

If skim-milk is given to calves it should be boiled, and suffered to stand till it cools to the temperature of that first given by the cow. It is better boiled than when warmed only. If the milk be given too cold it will cause the calf to purge. If this is the case, put two or three spoonfuls of runnet into the milk, and it will stop the looseness. If the calf is bound, pork broth is said to be a good and safe thing to put into the milk.

Dr. Deane was of opinion that it was better to wean calves on hay than on grass. 'They are more docile when raised in the barn, and thrive better.' A Mr. John Gordon says that 'calves should not be suffered to eat any grass the first year, and from experience I find it much the cheapest to keep them shut up and feed them, as the land sufficient to pasture one will produce hay enough to feed two calves through the year, and pay the expense of cultivation, and one year's growth will certainly be added to the cattle.*

It is not probable, however, that many of our farmers will incur the trouble of raising calves in a barn; therefore, 'when calves are put in a pasture, it should be such as is dry and sweet. White clover is the best for them; red clover or trefoil is also good. Mr. L. Hommedieu recommends that there be no water in the pasture, but sufficient shade. The effect of this is that the calves learn to feed at night, or when the dew is on, and lie by in the day; and as the grass while wet with dew is believed to be most nourishing, they will in this way thrive much better than those which have free access to water; for this, it is contended by Mr. L. Hommedieu, has a tendency to stunt them, and make them pot-bellied. Probably the better way is, to give them a little nourishing drink at certain times, when the dews fail, or at mid-day, when the weather is very warm.'†

The best calves for bringing up are those calved early in the season, or before June. 'When calves are weaned, they should not be suffered to be with their dams any more till fall; neither should they be pastured within sight or hearing of them. It will cause them to neglect their feeding; and they will not forget their sucking.

At the setting in of cold nights in autumn, calves must be nightly housed; and not be out early in the morning, nor late in the evening. And as the pinching cold of winter will be extremely detrimental to them, they should be kept very warm in their house, well supplied with water, and let out only on the warmest days. A great deal of care is necessary to bring them through the first winter, which is the most dangerous period of their lives. They will acquire so much strength during the following summer that they will have nothing to fear from the cold of a second winter.'—*Buffon, Histoire Naturelle.*

The American Farmer gives the following method of

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* Mass. Agr. Rep. vol. v. p. 78. † Farmer's Assistant.

making *hay tea* for calves. Take about a pound of red clover hay, well got in, and six quarts of clear spring water; boil them together till the water is reduced to four quarts; then take out the hay and mix a pound of barley, oat, bean, [or Indian] meal amongst a little water, put it in the pot or cauldron while boiling, and keep it constantly stirring until it is thickened. Let it cool, then give it to the calf, adding as much whey as will make a sufficient meal.

To make calves lie quiet, more especially during a temporary scarcity of milk, balls made of wheat flour, and a sufficient quantity of gin to form it into a paste, are recommended by Mr. Marshall; three balls about the size of walnuts to be given about a quarter of an hour before each meal. The effect is, that instead of wasting themselves by incessant 'bawling,' they lie quiet, sleeping a principal part of the time. Probably, Indian or rye meal, mixed up with gin, whiskey, or other cheap spirit, might answer a good purpose as an occasional expedient. We should not advise, however, to often diet calves in that manner, unless they were intended for the butcher; for we should be apprehensive that feeding them with such nice messes would render them too delicate and *mealy mouthed* to become hardy and profitable cattle. Young advises, when calves are troubled with scouring, to give them powdered chalk and wheat meal, worked into a ball with gin.

The following is the mode of rearing calves adopted by the society denominated Shakers, in Canterbury, New Hampshire, communicated in a letter from Mr. Francis Winkley to Mr. Levi Bartlett, of Warren, New Hampshire, and published in the New England Farmer, vol. ii. p. 305.

'We let calves that come in the fore part of March suck about a week or ten days, then take them from the cow, giving them a moderate allowance of new milk to drink, till they have learned to drink it freely; then put in some skimmed milk; and we feed them wholly with skimmed milk, taking care to give it at about the temperature of milk taken directly from the cow, by heating a part of it and mixing it with the rest. Care should be taken not to scald the milk when heated; also not to give them any sour milk, for this will make them scour. The trough or vessel in which they drink their milk should likewise be kept clean, and not suffered to become sour.

'We let the milk stand about twelve hours before it is skimmed; giving a calf at first about four quarts night and morning; increasing the mess as need requires till he is six weeks old, from which time till ten weeks old he will require, perhaps, about twelve quarts per day.

'When about ten weeks old, we begin to diminish the quantity of milk for about the space of two or three weeks, at which time we wean them. During the whole process from two to fourteen weeks of age, calves should be well supplied with good hay, salt, and provender; such as oats, wheat bran, and oil cake, ground fine.

'The particular advantages to be derived from the above method of treatment are the following:

'1. It is much cheaper than to let them suck in the ordinary way; whereas it makes a great saving of cream for butter, and that without injuring the calves, if they are properly attended to.

'2. It prevents calves from moaning or pining so much while weaning, as they would otherwise do, when taken from the cows.

'3. It not only prevents the cows being injured in consequence of the calves biting the teats, but also prevents their holding back the milk from the milker, which often serves to diminish the quantity of milk afterwards.

'The only disadvantage to be found in the above method of treatment is, that it requires some more labor to feed them, where they thrive equally well in every respect as those do which are permitted to suck in the ordinary way.'

The following is from the *United States Gazette.*

'Among the modern improvements in farming, the dairy has of late years been very much neglected. So much of the profit of breeders depending upon the facility with which the milk of the cow may be reserved during the sucking time of the calf, the following substitute, used in Germany, for the natural food of the young progeny, may be acceptable to our country readers.

'Let as much water be heated on the fire as the calf will be disposed to drink, and when it boils throw one or two handfuls of oat meal* into it, and after continuing in that state for one minute, take it off, and let it be cooled to the temperature of new milk, when one or two pints of skimmed milk are to be added to it. With this beverage, the young animal will fatten and thrive prodigiously: the milk of the parent will be applied to the dairy, and the intelligent

* Indian meal will do as well.

farmer will immediately discover the great advantage to be derived in the produce of the dairy from such an expedient.'

Willich's Encyclopedia observes, 'In order to make calves fine and fat, the best and most efficacious way is, to keep them as clean as possible, by elevating their coops in such a manner that the sun may not have too great power over them, and to such a height above the level of the ground that their urine may pass off; by giving them fresh litter every day, and suspending over the coop a large chalk-stone, so that they can easily lick it. Besides this, it is usual to bleed them when they are about a month old, and again just before they are slaughtered; which practice tends in a considerable degree to the beauty and whiteness of the flesh, and is therefore more frequently repeated by some farmers; [in England;] but this is not altogether necessary; twice bleeding being fully sufficient for that purpose, in the opinion of the most experienced breeders. It is, however, to be observed, that those calves which are intended for bulls or for oxen should be selected as soon as possible; as the operation necessary to make them oxen should not be deferred till the calves are more than twenty days old.

A writer for the N. E. Farmer, with the signature S. X., vol. viii. p. 76, observes, that 'A very intelligent practical farmer states that he considers nothing more conducive to the thriving of sucking calves than to keep in their pen an ample supply of dry yellow loam, of which they are at liberty to eat freely as they choose. They will eat it eagerly, and he regards it of more value than Indian meal. There is no better evidence of its utility than the fact that no man's calves find a readier sale or bring a higher price in our market than his. The philosophy of it we do not pretend to explain.'

Moubray says, 'The calf may be sold (or taken from the cow) as soon as it has drawn the biestings or first milk, unless any *coring* or defect in the cow's udder or teats may render it desirable for the calf to suck a few days, in order that the action may clear off any obstructions, for which the butting of the calf's head is generally the best remedy. If intended to be fattened for the butcher, it must be kept in a pen particularly dry and clean; suckled twice a day at regular hours; always have the first, which is the thinnest of the milk, and not be permitted to overcharge its stomach. Lumps of soft chalk are usually placed for the calf to lick, as an absorbent to neutralize the acidities engendered in the

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stomach from feeding on milk. It seldom pays to fatten a calf beyond ten or twelve weeks.

'*Weaning and rearing Calves.* A calf may be weaned by being gradually accustomed to suck milk in a pail through the fingers. Many are reared on very little milk mixed with hay tea, linseed, or other slops; fed on straw in the winter, and in summer on the common: such cannot be expected to turn to much account. The best cattle are reared from the teats, well wintered in good shelter, and full fed until they attain their growth. Warmth and dry lodging are of the utmost consequence to the improvement of all young animals. Calves may, however, be reared to good profit by being suffered to suck a very moderate quantity daily, the bulk of their food consisting of skimmed milk, thickened with oat or wheat meal; their winter food being carrots or Swedish turnips sliced, and cut straw, with a small quantity of hay, daily.'

The *Grazier's Guide* observes, 'If the calf be intended for the butcher, it may be taken from the cow in about a week or ten days, and fed the remainder of the time by hand; but the time of taking the calf away must be determined by the state of the cow's udder; for unless that be free from kernels and indurations, the calf must be allowed to suck, as the jolting of its head is the means of healing or restoring the udder, and preventing the downfall or inflammation in this part, which might cause much trouble, and even endanger the life of the cow.

'But if the calf is intended to be reared, it should not be weaned until at least six weeks or even two months old, whether male or female. For such there is no food like the cow's milk; and if she does not yield a sufficient quantity, that of another ought to be had recourse to. It is an incontrovertible fact, that the longer a calf sucks, not only the larger and stronger will it become, but it will also acquire a much better form and more robust health.'

Calves which come early should be preferred for the rearing. Those which come late do not acquire sufficient strength to bear the cold of winter; they languish, and are reared with difficulty. Calves should not be weaned too suddenly, but by little and little. The less they are able to eat, the more they should be allowed to suck; after a while they may be brought to take it from the pail. This is done by placing the hand in the milk, with the palm upwards, and under the milk, while the fingers are raised above the surface of the milk for the calf to lay hold of with its mouth, which it does very readily, and sucks up the milk with great ease.

When they are completely taken away, they should be fed with a little bran, and some of the best soft and fragrant hay of the second crop; they should be allowed plenty of the skimmed milk, and now and then a little water in which barley has been boiled and broken up, or a little buttermilk occasionally. There is at first some difficulty in bringing them to drink, but a little perseverance will accustom them to it.

Moderate warmth and *dry lodging* are of the utmost consequence to young calves; and if we would turn them to any good account, they must not be stinted either in these or in their food. Calves which have recently been weaned and are not at pasture should be fed often, at least three times, and it is better five times a day. As soon as they are fit to follow the mother they should be let out, as they are greatly benefited by air and exercise. Calves sometimes acquire a habit of sucking one another, of which trick they may be broken by separating them.

Calves cannot be kept too clean, nor have fresh litter too often. If they are suffered to lie on their own dung and urine, they will become mangy, and scarcely ever thrive. They are subject to several disorders, such as diarrhœa, dysentery, costiveness, &c. As a means of preventing the greater number of the diseases to which they are liable, the following rules are prescribed in the *Farmer's and Grazier's Guide.*

1st. Let the young calf suck the first milk. This will cleanse its bowels, and prevent costiveness.

2d. Let it suck from its mother at least two months, and then wean it gradually.

3d. Let its first food be such as is easy of digestion, and let it have plenty of sweet skimmed milk and good hay.

4th. Keep it very clean, well rubbing it occasionally with a wisp of hay or straw.

5th. Keep its stable clean, and perfectly free from all impurities.

6th. Let it have gentle exercise; the best will be following the mother in the meadow or pasture.

7th. Do not stint it either in good food or good drink, and change its litter often enough to keep it clean, sweet, and dry.

OXEN. Till oxen are four years old they are usually called steers; afterwards oxen. The signs of a good ox, according to Dr. Deane, are these: thick, soft, smooth, and short hair; a short and thick head; glossy, smooth horns; large and shaggy ears; wide forehead; full, black eyes; wide nostrils; black lips; a thick fleshy neck and large shoulders; broad reins; a large belly; thick rump and thighs; a straight back; a long tail, well covered with hair; short and broad hoofs. The best colors are brown, dark red, and brindled. When an ox has completed his eighth year he should be fattened.

If oxen are worked in the yoke in wet weather, their necks are apt to become sore. To prevent this a little tallow should be rubbed on the parts of the yoke which lie upon their necks, and also on the bows.

The following remarks on the management of working oxen are from the N. E. Farmer, vol. vi. p. 191.

'Do not retard the growth of your beasts of draught, endanger their health, and render them insignificant in the eyes of many, by working them hard while young. But the younger they are inured to light work, the more docile they will generally become.

'An English writer recommends carding oxen, and says "the ox, after the sensation becomes familiar, receives pleasure from the operation, and will momentarily forego his meal to receive the full enjoyment. His feeder perceives this, and brushes the part which gives the most pleasure. The ox shows his gratitude by wagging his tail; the feeder in return calls him by name, and ingratiates himself with him. Thus not only an intimacy but a mutual affection is formed, which at once gives attention to the keeper and docility to the ox, and renders the labors of both pleasant."

'Their labor and their fodder ought to be proportioned, that their health and their spirits may be kept in full tone. Their coats ought to be sleek; their hides loose and silky; the flank should fill the hand, and the shoulder handle mellow. If they be overworked or underfed, sluggishness and disease will inevitably follow. A working ox ought always to *be beef*, that in case of accident he may be fit for the table.'

The common mode of working oxen by a yoke has been condemned by many agricultural writers. Mr. Cooper, an Englishman, according to *Young's Eastern Tour*, used collars on oxen as on horses, except that they were buckled on with the narrow and open end downward. They draw in harness abreast in pairs, single, or in a line, *and walk as fast as horses.* Mr. Bordley said he 'saw a wagon in Pennsylvania drawn by two bulls and two oxen, bridled and geered in harness and collars.'

It appears by a work entitled '*Letters from Cuba,*' by Dr. Abiel Abbot, that in managing the oxen of that island, the yoke is made fast to the horns, 'near the root, behind, so that it does not play backward and forward, and gives to the oxen a similar but *better* chance of backing, (as, in teamster's phrase, it is called.) I have been astonished at the power of those oxen in holding back. There is a short hill in one of the streets of this city, at an angle nearly of forty-five degrees. Standing at the foot of it, I saw a cart and oxen approaching at the top, with three hogsheads of molasses, and the driver sitting on the forward cask. The driver did not so much as leave his perch; the oxen went straight and fearless over the pitch of the hill, and it seemed as if they must be crushed to death. The animals squatted like a dog, and rather slid than walked to the bottom of the hill. Have we any animals that could have done it? And if they could, have we any docile enough to have done it with the driver in the cart? Thus superior is this mode of yoking in holding back the load in difficult places.

'It gives them still more decisive advantage in drawing. A fillet of canvas is laid on the front below the horns; and over this fillet the cords pass, and the animal presses against the most invulnerable part of his frame; his head, his neck, his whole frame are exerted in the very manner in which he exerts his mighty strength in combat. It is the *natural* way, therefore, of availing yourself of this powerful and patient animal to the best advantage.'

A writer for the Genessee Farmer observes, that 'the frequent abuse of our laboring animals by those who receive the benefits of their labors, and who ought in return to treat them mercifully, has often given me great pain. I have employed in the course of my business a great many men and teams, both with oxen and horses, and I never yet knew a bawling, noisy, whipping teamster who did a great day's work; nor have I scarcely known such a one who kept a fat team. The best man who ever did me any labor was a good substantial farmer; his oxen were always fat, and spry as colts; he would never hitch them to any thing which he knew they could not draw; of course they were not discouraged; and he hardly ever spoke to them louder than in a low tone of common conversation. He would frequently talk to them soothingly, and encourage them when he had a hard job on hand, which was often the case. After making a heavy pull he would sometimes pat them on the back, but I rarely ever knew him to strike or worry his team. He carried a slender goad with a short lash to guide them with, and a mere swing of the whip was sufficient for his purposes. I have known several such persons in my life, and I do not hesitate to say that any person who so manages his team will get more labor at less expense, and with more ease to himself, than by the ordinary bawling, whipping method so much practised in our country. All the difference with these people is, that the one understands and studies the nature and disposition of his animals, and the other does not. "An even temper and a steady hand" ought to be the teamster's motto, the world over.'

The following valuable observations on the subject of breaking steers and colts are extracted from a communication written for the New England Farmer, by Mr. James Walker, of Fryeburgh, Maine, and published in that paper, volume xii. p. 113.

'I call my young cattle calves till they are one year old. I have a little yoke made with a staple and ring in it. I tell my little boys to yoke up their calves: a small boy can do it, and it is quite a pastime to them; they being so young, are not so strong but that he can manage them with ease; any small stick or twig answers to drive them with, and there is no danger of the boy or steers being hurt. When he can drive them where he wishes them to go, which will soon be the case, he will hitch them to a small piece of wood, or if in winter put them to a hand-sled, and drive round with that; they will soon become docile. There is no trouble with them afterward, especially if they are yoked a few times the second winter; it makes them fond of their mates. Oxen that are trained when young are much more pliable and obedient, which adds much to their value: steers that run till they are three or four years old are dangerous animals to encounter with; they are always running away with the cart or sled whenever there is a chance for them, and often serious injury is the result. I would not recommend working steers hard while young, as it would prevent their growth: there is a difference between working them and barely training them.

'Colts I begin with very soon after they are foaled; the mare should be bridled and led to the door, and given a little salt. When the colt is one or two days old, take him by the neck, handle him gently; he is then so young that he is not afraid, if his dam is near by him; continue this practice, and he will very soon become fond of his owner, and will come on purpose to be handled after two or three weeks. It does not hurt the mare or the colt to use her moderately. If you want to go to meeting on the Sabbath, harness the mare into the chaise or wagon, and tie the colt to the arm of the carriage; he may be a little obstinate at first, but in going a few rods will be peaceable and very orderly; if there are many other horses about, your colt is always with you: if you want to stop at a place any time, let your colt loose; he can be taken again without difficulty, and before you start off tie your colt again; in this way there is no trouble of the colt following other horses away. When they become old enough for service, you do not have to run all over the pasture for the horses; they can always be taken with ease. Colts trained in this way are completely halter broken. When you begin to harness them, they are not frightened at the noise of the carriage behind them, and are sooner made quiet in the harness. It has been a common saying that if colts are handled when they are young, it depresses their courage, which I am convinced is not the fact. I have raised as many horses as most farmers of my age in this vicinity, and some of them the most spirited I ever saw. The above rules I have practised for quite a number of years, and can recommend them to others with confidence. It convinces me of the truth and efficacy of a rule I have found in an old book I have, much worn by usage, although yet whole—it has been in our family almost a hundred years—which says, "Train up a child in the way he should go, and when he is old he will not depart from it." Train up beasts while young, and I know when they are old they will be serviceable to their owners.'

On training Oxen to back a Cart. A writer for the Maine Farmer, with the signature of *A Teamster*, whose communication was republished in the N. E. Farmer, vol. xi. p. 353, states as follows:

'I have observed that very little if any attention is paid by our farmers to learn their steers to back; but as they become able to draw a very considerable load forward, they are often unmercifully beaten on the head and face because they will not back a cart or sled with as large a load as they can draw forwards, forgetting that much pains have been taken to learn them to draw well forward, but none to learn them to push backward. To remedy the occasion of this thumping, and the delay, which is always disagreeable, as soon as I have learned my steers to be handy, as it is called, and to draw forward, I place them on a cart where the land is descending in a small degree. In this situation they will soon learn with ease to back it; then I place them on level land, and exercise them there; then I learn them to back a cart up land a little rising: the cart having no load in it thus far. When I have learned them to stand up to the tongue as they ought and back an empty cart, I next either put a small weight in the cart, or take them where the land rises faster, which answers the same purpose. Thus in a few days they can be learned to back well, and know how to do it, which by a little use afterwards they will never forget. This may appear of little consequence to some, but when it is remembered how frequently we want to back a load when we are at work with our cattle, and how commodious it often is to have our cattle back well, why should we not learn them for the time when we want them thus to lay out their strength? Besides, it saves the blows and vexation often encountered, which is considerable when one is in haste. It is a merciful course towards our brutes. I never consider a pair of oxen well broke until they will back with ease any reasonable load, and I would give a very considerable sum more for a yoke of oxen thus tutored than for a yoke not thus trained.'

Oxen sometimes contract a bad habit of pulling or hauling against each other; and sometimes crowd each other, so as to render them almost entirely useless as laborers. It is said that by turning them out to feed in the yoke they will learn to move in concert, and thus be broken of the habits of pulling and crowding.

In the *Transactions of the Society of Arts* the following mode of training oxen to the draught is recommended: 'Put a broad strap round their necks, fasten one end to a large log of wood; permit the ox to drag it about as he feeds in his pasture, before he is put in harness, by which his docility is much forwarded.' If a yoke of oxen were fastened to a heavy loaded sled or drag, placed in a pasture, and the oxen secured in such a manner that they could not cast or injure themselves, and the load were so heavy that they must act in concert to move it, they would soon learn to pull together, and be true to the yoke. Having eaten the grass within reach of their first location, they would of necessity unite their efforts to remove their load to a fresh spot, and would adopt for their motto, *united* we *feed*, *divided* we *starve*.

Diseases of Cattle. Our limits will not admit of our being very copious under this head; but some of the most common ails to which cattle are subject shall be briefly treated of, and the remedies prescribed.

Cattle are apt to be *hoven* or *swollen* in consequence of having eaten too much green succulent food. The common remedy for this disorder has been to stab the infected animal with a penknife or other sharp instrument under the short ribs, and put into the orifice a tube of ivory, elder, a quill, or something of the kind, to give vent to the confined air. The wound is then dressed with some sort of adhesive plaster, such as Burgundy pitch, and thus in general the cure is effected. This, however, according to the *Grazier's Guide*, is a bad practice; a second attack becomes more difficult to cure, as the wound adheres to the side, and every repetition increases the danger.

The thirty-third volume of Young's Annals of Agriculture prescribes the following recipe for hoven cattle, which it states will effect a cure in the most desperate cases in half an hour. Take three quarters of a pint of olive oil, one pint of melted butter or hog's lard; give this mixture by means of a horn or bottle, and if it does not produce a favorable change in a quarter of an hour, repeat the same quantity, and walk the animal gently about. For sheep attacked with this malady the dose is from a wine-glass and a half to two wine-glasses.

The following remedy for this complaint has also been recommended. Make about a pint of lye, either with hot embers thrown into a sufficient quantity of water, or by dissolving therein about an ounce of pot or pearl-ash, and turn it down the throat of the ox or cow affected. A proportionably less quantity will answer for a sheep. This is said to give immediate relief, by neutralizing the carbonic acid gas in the stomach of the animal, which causes the swelling and other symptoms of the complaint to subside.

Besides these remedies, flexible tubes and canes, with knobs on their ends, tarred rope, whip handles, &c., have been used to force a passage from the mouth to the stomach, to let the confined air escape upwards from the trunk of the animal affected. Descriptions of some of these instruments may be seen in the Domestic Encyclopedia, vol. i. p. 409, 410. Loudon likewise observes, that 'the flexible tube for the relief of cattle that are hoven or choked, consists of a strong leathern tube, about four feet long and half an inch diameter, with a leaden nozzle, pierced with holes at the insertion end. It should be kept in every farmery. There is a similar one on a smaller scale, which should be kept by every shepherd.'

In turning cattle or sheep into fresh and rank clover or lucerne, care should be taken at first to let them remain but a short time when the grass is dry, and then turn them out again, that they may by degrees become accustomed to the rich herbage.

Hoof-ail, or Hoof Distemper. A writer for the *Massachusetts Agricultural Repository*, vol. iv. p. 339, gives some account of this disorder, from which we extract the following.

'*Symptoms.* When an animal is at all lame, its foot should be carefully felt. The first indication is usually an uncommon degree of warmth, and a soft and puffed feel of the parts immediately connected with the slit between the hoof, either before or behind the foot, and generally just above it. If in the hind foot, and not easily handled, a fulness may generally be perceived, by standing behind the animal, and carefully comparing the appearance of the two feet between the dew-claws and the hoofs, (for it very rarely commences its attack on more than one foot.) In the fore foot it generally swells forward; and in taking up the foot the slit between the hoofs will generally have the appearance of dryness, easily distinguishable to a person used to cattle; and the animal frequently licks the front part of the foot. Instances frequently occur of sudden and extreme lameness, without any appearance of heat or swelling in the foot; and these are often the worst cases; but one symptom rarely fails to accompany the disease, which is extreme restlessness and appearance of anguish, attended with loss of appetite and flesh, but without in the least affecting the brightness of the eye, and, perhaps, sometimes unnaturally increasing it; but the eye has a peculiar cast. As a general rule it is safest to attribute all lameness of the foot which cannot be traced to a sufficient cause to the hoof-ail. Lameness of the foot can generally be distinguished from that of the leg, hip, or shoulder, by making the animal step over a stick or rail, and carefully watching its motions.

'*Remedies.* The foot should be carefully washed and cleansed and thoroughly examined, to be sure that the lameness does not arise from a nail casually run into the foot, or a prick in shoeing, from a wound from a stump or other substance between the hoofs, (a case frequently occurring.) If no appearance occurs of any break in the skin, while the foot is still wet apply as near as may be to the centre of the slit between the hoofs from one to three grains of corrosive sublimate, (reduced to a fine powder,) the dose to be proportioned to the size of the animal and the violence of the attack. Care must be used that the powder is put completely in this slit, for it is a very strong poison, and the animal as soon as at liberty will begin to lick the foot if a sore one. The moisture left by the washing makes the powder adhere, and the effect is produced in a very short time. Some prefer mixing the powder with hog's lard, which answers; but is thought less powerful: it has one advantage, however, as being less dangerous to keep in a house, (for no one takes salve inwardly.) Where corrosive sublimate cannot be obtained, any other violent stimulant may be applied. Common salt is often effectual in very slight attacks; but it is of the greatest importance to lose no time. The application is to be repeated every twenty-four hours till a cure is effected, or till the foot shows unequivocal signs of a gathering which will break.'

Loss of the Cud. Rumination, or the chewing of the cud, is that motion of the rumex or first stomach by which the food is forced back into the mouth to be perfectly masticated. This motion is not sudden or violent, like that of vomiting; but gradual and gentle, when the animal is healthy. When, therefore, an animal ceases to perform this essential act of digestion, it is an evident proof that the stomach is out of order; it may depend on the state of the first stomach, or it may proceed from the third.

Loudon asserts that although 'loss of the cud enters into the list of most of cow leeches' diseases, it is less a disease than a symptom of some other affection; indeed it is evident that any attack sufficient to destroy the appetite will, generally, occasion the loss of the cud. It is possible, however, that an occasional local affection, or paralysis of the paunch, may occur, particularly when it is distended with unhealthy substances, as acorns crab-apples, the tops of some of the woody shrubs, &c. The *treatment* in such cases consists in stimulating the stomach by tonics, aloes, pepper, and gin, mixed. Though these as liquids may not enter the stomach in common cases, yet in this disease or impaired action of the rumex they will enter there.'

Mr. Lawrence, an English writer, says, in loss of cud, 'Let the animal fast some time, then give a warm bran or pollard mash, with good hay and warm water with salt. This treatment alone may succeed with patience, even should the maw be obstructed with acorns or crab-apples. An aloes' tincture made with brandy and ginger, or capsicum, [red pepper] might be of use in this case. After conquering the obstruction, bitter infusions made of camomile, hoarhound, oak bark, &c. in beer may be required, as restoratives, although, perhaps, good dry nourishing food will have an equally good effect.

Horn-ail. or Horn Distemper. 'In the spring, cattle which have been poorly kept through the winter are subject to a wasting of the pith of the horn, which is usually called the *horn distemper*. It is sometimes in one horn only and sometimes in both. The indications of the disease are coldness of the horn, dullness of the eyes, sluggishness, want of appetite, and a disposition to lie down. When the brain is affected, the animal will toss its head, groan, and exhibit indications of great pain.

To cure the disease Dr. Deane directed to bore a hole with a nail gimblet into the lower part of the horn, through which the foul matter may be discharged. By this boring, which should be nearly horizontal, or in the depending part of the horn, and two or three inches from the head of the animal, the cure is sometimes completed. When it proves otherwise, a mixture of rum and honey with myrrh and aloes should be thrown into the horn with a syringe, and be several times repeated if the disease continue.

Lovett Peters, Esq. of Westborough, Massachusetts, in a communication published in the New England Farmer, vol. vii. page 194, gives the following recipe for curing this disease, which he observes was furnished him by an aged friend, and successfully applied to 'a cow taken with horn-ail to that degree that she had nearly stopped eating, and from giving a large quantity of milk had become nearly dry.'

'Take of salt one half-pint, of soot one half-pint, of black pepper one table-spoonful; make all fine, and give one or two spoonfuls at a time, night and morning. It is easily done by drawing the tongue out of the mouth with the hand, and putting the spoon as far down as it will reach, then let go the tongue, and keep up the nose, and it will all go down.' Mr. Peters says, 'I followed the directions, and in two days my cow was better; and in a week was perfectly well. The same may not cure in all cases of horn-ail, as my informant said it would, but it is worth the trial.

It should seem, however, as Mr. Peters suggested, that the above-mentioned remedy is not infallible. Mr. Thomas Hazen, in a communication published in the New England Farmer, vol. vii. p. 234, states that he tried it without success; but, by the advice of a large owner of cattle, he freely applied spirits of turpentine to an ox in high flesh, but afflicted with the horn-ail, on the top of the head along the roots of the horns, for a number of days. The ox soon began to feed well, and in a few weeks was sold for market. It is a severe remedy, throwing the animal into extreme agony.'

Dr. Cooper, in the last Philadelphia edition of *Willich's Domestic Encyclopedia*, directs, For the *hollow horn*, saw off the diseased part; dress with turpentine; keep the animal warm, and do not starve him. It is a disease owing to want of food and exposure to cold.

Remedy for Cattle when choked by Roots or other substances. Mr. Joseph Wingate, of Maine, in a communication for the New England Farmer, vol. iii. page 57, says, that every farmer should have a rope, which is to be put down into any animal's throat when choked with any hard substance, such as a turnip, potato, or an ear of corn. 'I have used this rope, and never found the least difficulty in giving immediate relief. Many cattle have died for the want of it, and many have been killed outright by using other means. Take an old tarred rope, six feet long. Let it be *served*, [strongly wound round with twine] and, when finished, be one inch in diameter. When put down the throat it should be pushed gently down four feet and a half into a cow or an ox. In cold weather it is stiff enough, but in warm weather it should be wet with cold water before it is used.'

Mr. E. Williams, of Westford, New York, in New England Farmer, vol. iii. p. 81, directs to an easier method to relieve the complaint: 'It is merely to pour down the throat one quart of very strong soap suds. I have seen it tried in numerous instances, and *invariably* with the best effect. It affords instantaneous relief.'

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BARNS. It is a common practice, and with many a general rule, to build a farm-house adjoining, and perhaps in contact with the sheds, barns, and other outhouses. When the buildings are thus all situated in one clump, if one takes fire, the whole will, probably, be consumed. Besides, it is disagreeable and unwholesome to live too near manure heaps, and as it were in the midst of your herds of cattle and swine. The barn should, therefore, be placed at a convenient distance from the dwelling-house and other buildings, but as near as may be without danger of fire, or annoyance from the effluvia of manure heaps. Too low a spot will be miry in spring and fall. Too high an eminence will be inconvenient for drawing in loads, and on account of saving and making manure. If other circumstances permit, it may be best to place a barn in such a manner as to defend the dwelling-house from the force of the coldest winds.

The size of the barn should be proportionate to the produce of the farm; for in this country, where building is not expensive, all the hay and grain should be placed under cover. It is a bad practice to leave hay in stacks, in the meadows where it is cut, to be there foddered out to the cattle in the course of the winter. By this mode of management the manure is almost lost. The ground under and near the stack receives some benefit from the droppings of the cattle, the litter, hay-seeds, &c. of the stack. But this benefit is trifling, as the sun, air, and rains soon exhale and wash away the manure, which being left on the surface of the soil, is soon given to the winds and the waters.

The farmers of the older parts of Pennsylvania, generally, build very large barns, and to prevent the hay or grain from heating in a large mow, four poles or pieces of timber are set up in the middle, so as to form within them a square space of about two feet. The poles are braced by cross-pieces at certain distances. Through the aperture thus made the extra moisture in the hay or grain has a chance to escape, so as to prevent its being mow-burnt. Their barns are usually built of stone, and in the walls a large number of small holes are made for the admission of air. Their cattle are chiefly all housed, and their dung is under cover, when thrown out of the stables, to prevent its being injured by the rains. The roofs of the barns are usually painted, to preserve them against the weather.

'The floor of the barn should be kept tight, so that the grain cannot fall through in threshing; and for this purpose it should have a layer of thin boards under it. It is most advisable also to have a place set apart in the barn for the purpose of storing away the grain after it is threshed. The bins for the grain should be made of hard plank, to prevent the rats and mice from eating through them, and should have lids, which can be fastened down with padlocks.'—*Farmer's Assistant.*

The following is a description of a large barn built in the town of Hancock, Berkshire county, Massachusetts, by the family of Shakers located in that place. It was originally published in the Middletown (Conn.,) Sentinel, and republished in the New England Farmer, vol. v. p. 215.

The barn is built on ground inclining southwardly, in a perfect circle, and is ninety feet in diameter across it from side to side. The walls are of stone, twenty-two feet in height, of a suitable thickness, and laid in lime, and well pointed on each side. Round the barn, on the inner side, are stables, forming a circle, the manger within, and suitable places over it to throw or feed down the hay; the stable and manger occupy about twelve feet, and are eight feet high; the stables open to and from several different barn-yards, in order to make as many and such divisions of stock as they have thought proper. The covering of the stables forms the barn floor, which also extends round the barn. There is but one large door-way for entrance with teams and loads; this is from the northern side, from an offset or causeway, eight feet above the base, and of course fourteen feet below the eaves. The cart or wagon that enters with a load makes the whole circuit of the floor, and after unloading comes out at the same door; thus eight or ten teams with their loads can occupy the floor at one time in unloading, and not hinder each other. Within this circle of the stables and barn floor is an area or *bay*, as it is usually called, which is filled with hay, &c., which must be over sixty feet in diameter. This is pitched *in* and *on* from any side or place most convenient, or where wanted.

The roof comes to a point at the centre, and sheds off the rain all round, something similar to an umbrella. It is supported from the inner circle of the barn floor. The roof boards are laid up and down, which, by a transverse sawing of the log, were all brought to a point, and then shingled round in the usual mode.

A writer for the New England Farmer, whose communication was published, vol. iii. p. 81, describes 'a barn of ordinary size, and the main part of it built in the usual shape, but a good deal neater and tighter. The bays were upon each side of the floor, and the bottoms of them were sunk eight feet below it. This gave room for a large quantity of hay below the floor. The large doors were towards the south, to admit the sun, when necessary, with a small door in one of the large ones to enter at when the weather was windy, and made it dangerous to open the large doors. Barns ought always to have a small door to use in the winter, when you must often be in and out. There were twelve squares of glass arranged over the door, to admit the light when the large doors were shut; besides a small window in each of the gable ends, very near the ridge, for the same purpose. Under the floor was a convenient cellar, in which were kept potatoes, and all kinds of vegetables for green fodder in the winter. The cellar was a very warm one, and well lighted with two windows. This cellar struck me as being the most useful apartment in the whole establishment, and I wonder that all farmers do not have one. There you may keep as many turnips, cabbages, potatoes, &c., as you please, and they are always handy to fodder out in the stable to your cattle; and the cattle need scarcely go out of the stable in a month.

'The yard was well watered by an aqueduct, and a trough on the south side of the barn was kept always full. Upon the north or back side of the barn were the stables: they were built in one building, and joined to the main part, about twenty-five feet in width, thirty feet long, and twelve or fourteen feet high. A door led from the barn into it, besides another from without upon the east side, where the cattle were admitted from the yard. A floor was laid overhead, at the distance of seven feet from the lower one. The stalls were arranged on each side of the building, so that the cattle stood with their heads towards the outside of the building, leaving a space in the middle to pass.

'In foddering, the hay was pitched from the bay in the barn through a window, over the stables, and then put down into racks; very little hay could be wasted in this way, and the boys could be trusted with the foddering. The manure made in the stable was put down through the floor into another cellar, large enough to admit of a cart and team to take it away.'

A report of the committee on farms, in the county of Essex, for the year 1824, states, that colonel Moses Newhall, in West Newbury, 'has lately built a barn, which for convenience and durability of construction is worthy of much praise. It is calculated better for the farmer's use than any one we have seen. It is not too much to say that during the haying season, the most busy season with the farmer, its superior conveniences will save at least the labor of one man on the farm. It is about eighty feet in length, thirty-four feet in width, and twenty feet post. It has two floors, one eight feet above the other; on the upper of which the hay is carried in. Mr. Newhall has favored the committee with a plan of it for the benefit of the society.'

The Shakers of Harvard, Massachusetts, have built a barn, which is probably larger than any other structure of the kind in the United States. The dimensions, we are told, are *one hundred and fifty feet in length, and forty-five in width.* It is four stories in height, and the calculation is to drive in on the upper floors, from the hill side, and pitch the hay down, thus rendering much hard labor easy.

Barn-Yards. The following '*Remarks on the Construction and Management of Cattle Yards,*' are from the pen of judge Buel, of Albany.

Vegetables, like animals, cannot thrive or subsist without food; and upon the quantity and quality of this depends the health and vigor of the vegetable, as well as of the animal. Both subsist upon animal and vegetable matter, both may be surfeited with excess, both may be injured by food not adapted to their habits, their appetites, or their digestive powers. A hog will receive no injury, but great benefit, from free access to a heap of corn or wheat, where a horse or cow will be apt to destroy themselves by excess. The goat will thrive upon the boughs and bark of trees, where the hog would starve. The powerful, robust maize will repay, in the increase of its grain, for a heavy dressing of strong dung; for which the more delicate wheat will requite you with very little but straw. The potato feeds ravenously, and grows luxuriantly, upon the coarsest litter; while many of the more tender exotics will thrive only on food upon which fermentation has exhausted its powers. But here the analogy stops: for while the food of the one is consumed in a sound, healthy, and generally solid state, the food of the other, before it becomes aliment, must undergo the process of putrefaction or decomposition, and be reduced to a liquid or æriform state.

I have gone into the analogy between animals and vege-

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tables thus far, to impress upon the minds of our farmers the importance of saving, and of applying the food of their vegetables with the same care and economy that they do the food of their animals. How scrupulously careful is the good husbandman of the produce of his farm destined to nourish and fatten his animals; and yet how often careless of the food which can alone nourish and mature his plants: while his fields are gleaned, and his grain, hay, and roots carefully housed, and economically dispensed to his animals, the food of his vegetables is suffered to waste on every part of his farm. Stercoraries we have none. The urine of the stock, which constitutes a moiety of the manure of animals, is all lost. The slovenly and wasteful practice of feeding at stacks in the fields, where the sole of the grass is broken, the fodder wasted, and the dung of little effect, is still pursued. And, finally, the little manure which does accumulate in the yards, is suffered to lie till it has lost full half of its fertilizing properties, or rotted the sills of the barn; when it is injudiciously applied, or the barn removed to get clear of the nuisance. Again: none but a slothful farmer will permit the flocks of his neighbors to rob his own of their food; yet he often sees, but with feeble efforts to prevent it, his plants smothered by pestiferous weeds, and plundered of the food which is essential to their health and vigor. *A weed consumes as much food as a useful plant.* This, to be sure, is the dark side of the picture; yet the original may be found in every town, and in almost every neighborhood.

Is it surprising that under such management our arable grounds should grow poor, and refuse to labor its accustomed reward? Can it be considered strange, that those who thus neglect to feed their plants should feel the evil of light purses, as well as of light crops? Constant draining or evaporation, without returning any thing, would in time exhaust the ocean of its waters. A constant cropping of the soil, without returning any thing to it, will in like manner exhaust it of its vegetable food, and gradually induce sterility. Neither sand, clay, lime, or magnesia, which are the elements of all soils, nor any combination of part or all of them, is alone capable of producing healthy plants. It is the animal and vegetable matter accumulated upon its bosom, or which art deposits there, with the auxiliary aid of these materials diffused in the atmosphere, that enables the earth to teem with vegetable life, and yield its tribute to man and beast.

I will now suggest a cheap and practicable mode of *pro-*

viding food for vegetables, commensurate to the means of every farmer of ordinary enterprize; and that my suggestions may not be deemed theoretical, I will add, that I 'practise what I preach.'

The cattle yard should be located on the south side of, and adjoining the barn. Sheds, substantial stone walls, or close board fences, should be erected at least on the east and west sides, to shelter the cattle from cold winds and storms; the size proportioned to the stock to be kept in it. Excavate the centre in a concave form, placing the earth removed upon the edges or lowest sides, leaving the borders ten or twelve feet broad, of a horizontal level, to feed the stock upon, and from two to five feet higher than the centre. This may be done with a plough and scraper, or shovel and handbarrow, after the ground is broken up with the plough. I used the former, and was employed a day and a half, with two hands and a team, in fitting two to my mind. When the soil is not sufficiently compact to hold water, the bottom should be bedded with six or eight inches of clay, well beat down, and covered with gravel or sand. This last labor is seldom required, except where the ground is very porous. My yards are constructed on a small loam, resting on a clay subsoil. Here should be annually deposited, as they can be conveniently collected, the weeds, coarse grass, and brakes of the farm; and also the pumpkin vines and potato tops. The quantity of these upon a farm is very great, and are collected and brought to the yard with little trouble by the teams returning from the fields. And here also should be fed out, or strewed as litter, the hay, stalks, and husks of Indian corn, pea and bean haulm, and the straw of grain not wanted in the stables. To still farther augment the mass, leached ashes and swamp earth may be added to advantage. These materials will absorb the liquid of the yard, and, becoming incorporated with the excrementitious matter, double or treble the ordinary quantity of manure. During the continuance of frost the excavation gives no inconvenience; and when the weather is soft, the borders afford ample room for the cattle. In this way, the urine is saved, and the waste incident to rains, &c. prevented. The cattle should be kept constantly yarded in winter, except when let out to water, and the yard frequently replenished with dry litter. Upon this plan, from ten to twelve loads of unfermented manure may be obtained every spring for each animal; and if the stable manure is spread over the yard, the quality of the dung will be improved, and the quantity proportionably increased. Any excess of liquid that may remain after the dung is removed in the spring, can be profitably applied to grass, grain, or garden crops. It is used extensively in Flanders, and in other parts of Europe.

Having explained my method of procuring and preserving the food of vegetables, I will proceed to state my practice in feeding or applying it. It is given, every spring, to such hoed crops as will do well upon coarse food, (my vegetable hogs and goats.) These are corn, potatoes, ruta baga, beans, and cabbages. These consume the coarser particles of the manure, which would have been lost during the summer in the yard; while the plough, harrow, and hoe eradicate the weeds which spring from the seeds it scatters. The finer parts of the food are preserved in the soil, to nourish the small grains which follow. The dung is spread upon the land as evenly as possible, and immediately turned under with the plough. It is thereby better distributed for the next crop, and becomes intimately mixed and incorporated with the soil by subsequent tillage. Thus, upon the data which I feel warranted in assuming, a farmer who keeps twenty horses and neat cattle will obtain from his yards and stables, every spring, two hundred loads of manure, besides what is made in summer, and the product of his hogsty. With this he may manure annually ten or twelve acres of corn, potatoes, &c., and manure it well. And if a proper rotation of crops is adopted, he will be able to keep in good heart, and progressively to improve, sixty acres of tillage land, so that each field shall be manured once every four or five years, on the return of the corn and potato crop.

DAIRY. The celebrated Arthur Young has the following remarks on this subject.

'Unless the farmer has a very diligent and industrious wife, who sees minutely to her dairy, or a most honest, diligent, and careful housekeeper to do it for him, he will assuredly lose money by his dairy; trusted to common servants, it will not pay charges. The dairymaid must be up every morning at four o'clock, or she will be backward in her business. At five the cows must be milked, and there must be milkers enough to finish by six. The same rule must be observed in the evening.

'In making butter the dairymaids are particularly attentive to one circumstance, that there must be a certain proportion of *sour* in the cream, either natural or artificial, cr they cannot insure a good churning of butter ; some keep a little of the old cream for that purpose ; others use a little runnet ; and some a little lemon juice.'

In order to determine which cow's milk is best for cream, it has been recommended to let the milk of each be put by itself, and churn each separately.

The properties requisite in a dairy-house are, that it be cool in summer and moderately warm in winter, so as to preserve nearly the same temperature throughout the year, which, according to Loudon, should be about forty-five degrees. A northern exposure, as much under the shade of trees as possible, is to be preferred. A well constructed butter dairy, says Loudon, should consist of three apartments; a milk house, a churning house, with proper boiler, as well as other conveniences for scalding and washing the implements, and a room to keep them in, and for drying and airing them, when the weather will not permit of its being done without doors. The cheese dairy should likewise consist of three apartments: a milk house, a scalding and pressing house, and a salting house. To these should be added a cheese room, or loft, which may with great propriety be made above the dairy. This is, however, generally separate from the dairy. But a milk dairy requires only a good milk house, and a room for scalding, cleaning, and airing the utensils.

A dairy for the private use of any farmer or family need not be large, and may very economically be formed in a thick-walled dry cellar, so situated as to have windows on two sides ; the north and east in preference for ventilation: and in order that these windows may the better exclude cold in winter and heat in summer, they should be fitted with double sashes, and on the outside of the outer sash should be a fixed frame of close wire netting or haircloth, to exclude flies and other insects.*

On Making and Preserving Butter. The dairy-house should be kept neat, should not front the south, south-east, or south-west. An apartment in a sweet and well ventilated cellar will answer a good purpose to keep milk and cream in.

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* For several different plans of dairy houses, see Loudon's Enc. of Agr. Par. 6300, &c.

Cheeses should not be set to dry in the same room where your milk is set, for they communicate an acid matter to the surrounding air, which will have a tendency to make the milk sour. The milk room and cheese room should therefore be separate apartments. It will be well to place your milk room, if possible, over a spring or brook, near the dwelling-house; and you may have a stone floor, and channels in the floor to pass the water round near the inside of the walls. Into these channels the pans may be set, filled with milk, and surrounded by water. If water could be introduced into the milk room so as to fall from some height on the pavement, it would likewise prove advantageous, as the waterfall and the evaporation it causes will contribute to preserve the air continually pure, fresh, and cool. As the milk itself when brought in warm will naturally tend to raise the temperature of the milk room too high, it is recommended to have an ice-house attached to the dairy, especially where the advantage of a current of water cannot be obtained. An ice-house would prove still more profitable if the dairy be situated near large towns, where the ice could be sold in summer. According to Dr. Deane, the temperature of the milk room should be from fifty to fifty-five degrees of Fahrenheit's thermometer; and the Complete Grazier says, 'where the temperature of the milk room has become affected by the carrying of newly drawn milk into it, it may be easily reduced to the proper temperature by suspending a small quantity of ice at a considerable height from the floor; and if, during winter, the cold should become too great, a barrel of hot water closely stopped, or a few hot bricks placed on the floor or table of the milk room, will readily counteract its effects. But on no account whatever should a chafing-dish with burning coals be used, as it will certainly impart a bad taste to the milk.'

The proper receptacles for milk are tin or earthen pans, not glazed nor lined with lead, or wooden trays. Lead, copper, or brass utensils, as well as earthen-ware vessels glazed with lead, ought on no pretext whatever to be used; for the acid which is contained in milk combines with these metals, and forms a poisonous compound with them. Sir John Sinclair recommends vessels made of cast iron, softened by annealing them in charcoal, so that they will not break by an ordinary fall, turned smooth in the inside, and laid over with a coat of tin, to prevent the iron from coming in contact with the milk. These milk dishes are stated to be kept more easily clean than wooden vessels; and their superior power of conducting heat cools the milk so rapidly that the Scottish farmers' wives, who have given them a fair trial, affirm that they throw up *one-third more cream* from an equal quantity of milk.* Cast iron vessels, without being tinned, would give no poisonous quality to the milk, but they might render the produce of the dairy unpalatable.

'All dairy utensils ought to be most carefully scoured, first with hot water, and afterwards rinsed with cold, and kept in an airy place, in order that every possible degree of acidity may be removed. Should one or two scourings be insufficient, they must be repeatedly cleansed until they become entirely sweet, as the slightest taint or acidity may cause material loss.'† Slate, according to some accounts, makes very good milk coolers, and perhaps freestone might answer as well.

The quality and quantity of cows' milk greatly depends on the nature of their food. Potatoes, carrots, and parsnips are recommended as causing cows to give excellent milk; and mangel-wurtzel is highly spoken of for the same purpose. Cabbages, if sound, answer an excellent purpose, but the decayed leaves give a bad taste to the milk. It is thought best to milk cows three times a day if fully fed, and great caution should be exercised by the persons employed to draw the milk from them completely, not only to increase the quantity of produce, but to preserve its quality. Any portion which may be left in the udder seems gradually to be absorbed into the system, and no more is formed than enough to supply the loss of what is taken away; and by the continuance of the same mode a yet farther diminution takes place, until at length scarcely any is produced. This last mode of milking is practised when it is intended to render a cow dry.

'After the milk is drawn from the cow, it should be carefully strained through a linen cloth or a hair sieve, (Dr. Anderson prefers a sieve made of silver wires, on account of its superior wholesomeness,) into the cream dishes, which should never exceed three inches in depth, though they may be made so wide as to contain any quantity required, and which ought to be perfectly clean, sweet, and cool. If any ill flavor is apprehended from the cows having eaten turnips, &c., the addition of one-eighth part of boiling water to the milk be-

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* Agricultural Report of Scotland. † Complete Grazier.

fore it is poured into the dishes will effectually remove it.* When filled, the dishes ought to be set upon shelves or dressers, there to continue till the cream is removed. This should be steadily done by means of a skimming dish, if possible, without spilling any upon the floor, because it will speedily taint the air of the room; and the cream poured into a vessel, till enough be obtained for churning.

The Farmer's Assistant judiciously observes, 'If new milk be kept as warm as when it comes from the cow, no cream will rise on it; but when sufficiently cooled, the cream separates from the rest and rises to the top. In order then to effect this to the best advantage, the new milk should be made as cool as possible, and the cooler it is thus made the more suddenly and effectually the cream will rise. To set milkpans made of tin in beds of salt would no doubt be useful, where the cellar is too warm; and to set all milk vessels on a floor which is constantly covered with cold spring water is also an excellent plan.'

The following remarks relative to the best mode of making butter are chiefly derived from Dr. Anderson's valuable Essay on that subject. 1. The milk first drawn from a cow is always thinner, and inferior in quality to that afterwards obtained; and this richness increases gradually to the very last drop that can be drawn from the udder 2. The portion of cream rising first to the surface is richer in quality and greater in quantity than that which rises in the second equal space of time, and so of the rest, the cream decreasing and growing worse as long as it rises at all. 3. Thick milk produces a smaller proportion of cream than that which is thinner, though the cream of the former is of a richer quality. If thick milk therefore be diluted with water, it will afford more cream than it would have yielded in its pure state, though its quality will at the same time be inferior. 4. Milk carried about in pails, or other vessels, agitated and partly

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* Mr. Young has recommended the dairy-man to boil two ounces of nitre in one quart of water, and to bottle the mixture; of which, when cold, a large tea-cupful is to be added to ten or twelve quarts of milk as soon as it comes from the cow. The quantity of sal'petre is to be increased as the turnips become stronger. The feeding of cows with the *roots alone* will, as the earl of Egremont found, prevent the milk from having a bad taste. Another method of removing any ill flavor arising from the cows having eaten turnips, consists in warming the cream, and afterwards pouring it into a vessel of cold water; from which the cream is to be skimmed as it rises to the surface, and thus the unpleasant taste will be left behind in the water.

cooled before it is put into the milkpans, never throws up such good and plentiful cream as if it had been put into proper vessels immediately after it came from the cow.

From these fundamental facts, the doctor deduces, in substance, the following rules:

1. The cows should be milked as near the dairy as possible, to prevent the necessity of carrying and cooling the milk before it be put into the dishes; and as cows are much hurt by far driving, it must be a great advantage in a dairy farm to have the principal grass fields as near the dairy or homestead as possible. In this point of view, also, the practice of feeding cows in the house, rather than turning them out to pasture in the field, must be obviously beneficial.*

2. The practice of putting the milk of all the cows of a large dairy into one vessel, as it is milked, there to remain till the whole milking be finished, before any part is put into the milkpans, seems to be highly injudicious, not only on account of the loss sustained by the agitation and cooling, but also, the more especially, because it prevents the owner of the dairy from distinguishing the good from the bad cow's milk, so as to enlighten his judgment respecting the profit that he may derive from each. Without this precaution, he may have the whole of his dairy produce greatly debased by the milk of one bad cow for years together, without being able to discover it. A better practice, therefore, would be to have the milk drawn from each cow separately put into the creaming pans as soon as milked, without being ever mixed with any other; and if these pans were all made of such a size as to be able to contain the whole of one cow's milk, each in a separate pan, the careful *dai*† would thus be able to remark, without any trouble, the quantity of milk

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* Mr. Lawrence, in his 'Treatise on Cattle,' observes, that 'it is stated by theoretical writers, that to feed cows in the home stall increases their quantity of milk; a fact which various experiments compel me to disprove. With me it has ever had the effect of adding to the substance of the animal, and of diminishing the quantity of her milk; probably from defect of the exercise she was wont to take in collecting her food, and the selection of herbage she was enabled to make.' This writer, however, is of opinion, that 'the aggregate quantity of milk in a dairy may be enlarged by keeping pastures free from the tread of the cows, since a greater number may be kept, perhaps by one-third, on the same extent of ground; at the same time the animals may be secured from the harassing and debilitating effects of the sun and flies.

† A provincial word, denoting the person who has the chief concern in a dairy.

afforded by each cow every day, as well as the peculiar qualities of the cow's milk. And if the same cow's milk were always to be placed on the same part of the shelf, having the cow's name written beneath, there never could be the smallest difficulty in ascertaining which of the cows it would be for the owner's interest to dispose of, and which he ought to keep and breed from.

3. If it be intended to make butter of a *very fine quality*, it will be advisable, not only to reject entirely the milk of all those cows which yield cream of a bad quality, but also, in every case, to keep the milk that is first drawn from the cow at each milking entirely separate from that which is got last; as it is obvious, if this be not done, the quality of the butter must be greatly debased, without adding much to its quantity. It is also obvious, that the quality of the butter will be improved in proportion to the smallness of the quantity of the last drawn milk which is used, as it increases in richness to the very last drop that can be drawn from the udder at that time; so that those who wish to be singularly nice will do well to keep for their best butter a very small proportion of the last drawn milk.

Dr. Anderson proceeds to state in substance, that in the Highlands of Scotland the common practice is to let the calf suck till the dairymaid judges that it has had enough; it is then separated, the legs of the mother having been previously shackled by a very simple contrivance, to oblige her to stand still, and the dairymaid milks off what is left by the calf. In this way, he observes, the Highland butter has been greatly celebrated as the 'richest marrowy butter which can anywhere be met with.' The milk which is first drawn, and consequently of inferior quality, may be converted into an inferior kind of butter, sold sweet, or made into cheeses, which, by being made of sweet milk, if made with care and skill, may be of fine quality.

Churning ought to be regularly continued till the butter *comes*, or is formed. If the motion in summer be too quick, the butter will, in consequence, ferment, and become ill-tasted; and, in winter, it will *go back*. Churning, it is said, may be made easier by putting the bottom of the pump churn about one foot deep into a vessel of cold water, and continuing it there till the butter is made. The addition of one or two table-spoonfuls of distilled vinegar, after churning awhile, will, it is said, produce butter much sooner in many instances than it can be formed without such addition.

Some writers advise to wash the butter, after it is formed, thoroughly in several waters, till all the milk is removed. Dr. Anderson, however, advises to force the milk out of the cavities of the butter by means of a flat, wooden ladle, furnished with a short handle, at the same time agitating the butter as little as possible, lest it become tough and gluey. 'The beating up of butter,' he observes, 'by the hand, is an indelicate practice, particularly if it be constitutionally warm; and as it is hurtful to the quality of the butter to pour cold water on it during this operation, the butter, if too soft to receive the impression of the mould, may be put into small vessels, and there be permitted to float in a trough of cold water beneath the table, *without wetting the butter*, which will soon become sufficiently firm. Or, when butter is first made, after as much of the milk has been got out as possible, it may be thinly spread on a marble slab, and the remaining moisture be absorbed by patting it with clean dry towels.'

It is said in Bordley's Husbandry, that 'dashing in water, and then, without pause, clearing the butter from every particle of the water, is widely different from washing butter by kneading and letting it remain at all in the water. Very good butter for flavor, color, and consistence, is made by one who washes it twice, but never lets it remain in the water a moment. Another butter-maker says, mix the salt in the butter in the evening, and let it rest till morning, then work out the liquor, but never let it be once touched with water.

Dr. Anderson remarks, that a considerable degree of strength as well as dexterity is required in the working of butter. The thing wanted is to force out the milk entirely, with as little tawing [working] of the butter as possible, for if the milk be not entirely taken away, the butter will spoil in a short time; and if it be much worked the butter will become tough and gluey, which greatly debases its quality.

Before you put butter into the vessels which are to contain it, great care must be taken that they be well seasoned by frequent washing and exposure to the air for two or three weeks. As it is difficult to season new firkins, it will always be preferable to employ those which have been used. The most speedy method of seasoning firkins is by the use of unslacked lime, or a large quantity of salt and water, well boiled, with which they should be repeatedly scrubbed, and afterwards thrown into cold water, to remain there three or four days, till wanted. They should then be scrubbed as before, and well rinsed with cold water; and before the butter is put in, *every part* of the inside of the firkin must be well rubbed with salt.

Butter may be salted by working into it one or two ounces of salt, after the buttermilk has been forced out. The salt should be thoroughly incorporated, and be of the best and purest quality. Dr. Anderson, however, recommends the following preparation, which he has experienced to be much superior, as it not only prevents the butter from becoming in any degree rancid, but also improves its appearance, and imparts a sweeter and richer taste than could be given by common salt only. For every pound of butter take half an ounce of best common salt, one quarter of an ounce of loaf sugar, and one quarter of an ounce of saltpetre; beat and blend the whole completely together. Butter thus cured should stand three or four weeks before it is used, that the salts may be well mixed. The best butter is made in summer, but by adding a certain portion (which experience alone can determine) of the juice expressed from the pulp of carrots to the cream previously to churning; winter-made butter will thus acquire the appearance and flavor of butter that has been churned during the prime part of the summer season.

A writer for the *Journal of Humanity* gives the following rules for making good butter. 'If you have four or five cows, it is best to churn every day; and by no means less frequently than every other day. If you cannot churn every day, throw into the cream, when gathered, a handful of nice salt. In very warm weather, when milk sours soon, put two heaping table-spoonfuls of salt into every pail of milk before straining. The quantity as well as the quality of the butter is greatly improved by this method. If you have ice, put a small piece in every pan of milk, and also into the cream when you churn. If you have no ice, put the cream into a pail, and hang it in the well twelve hours before churning. In the warm season, cream should be skimmed as soon as it is in the least sour, and in the coldest weather, milk should not stand more than thirty-six or forty-eight hours. The utmost care should be taken to keep every article used in making butter perfectly sweet by frequent and thorough scalding.'

A writer for the New England Farmer, vol. vi. p. 370, observed as follows:

'It does not, in my opinion, improve the butter to have the milk sour before the cream is gathered; but at this season of the year [June] it can hardly be prevented. It should, however, never be suffered to stand till the milk curdles. When the cream is gathered it should be set in an open vessel, where the air can have free access to its surface; and during the time that the cream is gathering for a churning of butter, it should have a stick or spoon kept in the vessel where the cream is, by which the cream should be stirred at least half a dozen times a day, enough to mix it up well, and bring a new portion of it to the air; and it should stand before the window of the milk room, or some other, the most airy position afforded by the room. When you have gathered a mess for this season of the year, fill your churn over night with cold water, and empty it in the morning. Put in your cream and churn it with a regular, steady, and not too rapid motion. It will generally come in from ten to twenty minutes, and when fetched it needs no coloring matter.

'I know that women say flies will get into the cream if left uncovered; let them get in, and pick them out, rather than cover up the vessel containing the cream.*

'The windows to milk rooms, in many houses, are not sufficiently large, with from four to eight small panes of glass. This affords too stinted a portion of air. If your glass is small, you want a twenty-four lighted window to the milk room, with blinds to exclude the sun. If two such windows, so situated as to afford a draught of air, the better. But stint your milk room of air, and keep the cream pot covered tight to exclude flies, and your butter will be *white* and *bitter*, besides being a long while coming.'

Making Butter in Winter. A friend has furnished us with the following observations on this subject:

'In February, 1825, I spent a few days with Dr. Jones, who lives near Hyco bridge, in Halifax county, Virginia. Mrs. Jones prepares her cream for churning by heating the milk after it has stood twelve or twenty-four hours.

'She places it over coals the evening before churning, until the milk as it stands with the cream on is heated ready to boiling, when she sets it by till morning. The cream is then skimmed off, and churned by stirring in an earthern vessel. The butter is delicately white and clear in its complexion, firm, and fine flavored.

* Perhaps a covering of gauze, millinet, or other light and porous substance, or a lid perforated with small holes, might admit air and exclude the flies.—*Editor.*

'This process would, no doubt, prove more successful in any part of New England, since the climate of Virginia is generally less favorable to the dairy than that of the eastern states.'

From the same pen we are favored with the following:

Garlic in Butter. 'When milk has the flavor of garlic, or wild onion, add a quart of boiling water to each gallon, and set it away in vessels, having the bottom covered the thickness of an inch only with milk. The cream that rises will be sweet and free from any disagreeable flavor.'

L. Peters, Esq. of Westborough, Massachusetts, says, relative to making winter butter, 'My wife's method is to set the vessels in which the cream is collected near the fire a while before it is put into the churn, and frequently stir it a little, and turn the vessels, that it may be warmed equally, till it is as warm as cream in the summer, as near as she can judge; and before putting it into the churn, that is scalded with scalding water. When the churning commences, it is done moderately, and if there is any frothy appearance, then warm water is put in, the churn put near the fire, and occasionally turned, till the temperature is altered, and the churning is finished, which is generally in a short time. If a dash churn is used, set it into a tub of hot water, and frequently move the dash a little, to mix the warm and cold cream, till it is of a suitable warmth, which an observing person will soon ascertain by practice.'—*N. E. Farmer*, vol. vi. p. 370.

A valuable paper on the making of butter in cold weather, by the Rev. W. Allen, states the results of several trials, by which it appears that butter may be obtained in the coldest weather within from ten to twenty minutes, if the cream at the commencement of the churning is brought to the temperature of about seventy-five degrees Fahrenheit.

E. H. Derby, Esq. of Salem, Massachusetts, recommends the making of butter by the aid of frost, as follows:

'The milk when taken from the cows is immediately strained into earthen pans, and set in the coldest part of the house; as soon as the frost begins to operate, a separation takes place, the cream rises in a thick paste to the top, and leaves the milk, without a particle of cream, frozen in the pan. The cream is not so hard but that it can be easily scraped off with a spoon, to the solid ice; it is then set aside until a sufficient quantity is collected for churning, when it is warmed just so much as to thaw the cream sufficiently to put it into the churn. I have never known it to require more than five minutes to convert such cream into butter, after the churning had commenced.'

CHEESE—*Method of making.* 'The milk is universally set for cheese as soon as it comes from the cow.

'The management of the curd depends on the kind of cheese: thin cheese requires the least labor and attention.

'Breaking the curd is done with the hand and dish. The finer the curd is broken the better, particularly in thick cheeses. The best color of this kind of cheese is that of bees-wax, which is produced by annotta, rubbed into the milk after it is warmed. The dairy-woman is to judge of the quality by the color of the milk, as it differs much in strength. The runnet is prepared by taking some whey and salting till it will bear an egg; it is then suffered to stand over night, and in the morning it is skimmed and racked off clear; to this is added an equal quantity of water brine, strong as the whey, and into this mixture some sweet-briar, thyme, or some other sweet herbs; also a little black pepper and saltpetre; the herbs are kept in the brine three or four days, after which it is decanted clear from them. Into six quarts of this liquor four large calves' bags, or, more properly called, calves' stomachs, are put. No part of the preparation is heated, and frequently the calves' bags are only steeped in cold salt and water. Turning the milk differs in different dairies, no two dairy-women conducting exactly alike.

'Setting the milk too hot inclines the cheese to heave, and cooling it with cold water produces a similar effect. The degree of heat varies according to the weather. The curd when formed is broken with what is called a treple cheese knife. The use of this is to keep the fat in the cheese. It is drawn the depth of the curd two or three times across the tub, to give the whey an opportunity of running off clear; after a few minutes the knife is more freely used, and the curd is cut into small pieces like checkers, and is broken fine in the whey with the hand and a wooden dish. The curd being allowed about half an hour to settle, the whey is laded off with the dish, after it is pretty well separated from the curd.

'It is an almost invariable practice to scald the curd. The mass is first broken very fine, and then the scalding whey is added to it and stirred a few minutes; some make use of hot water in preference to whey, and it is in both cases heated according to the nature of the curd; if it is soft, the whey or water is used nearly boiling; but if hard, it is only used a little hotter than the hand. After the curd is thoroughly mixed with the hot stuff, it is suffered to stand a few minutes to settle, and is then separated as at the first operation. After the scalding liquor is separated, a vat, or what is often called a cheese hoop, is laid across the cheese ladder over the tub, and the curd is crumbled into it with the hands, and pressed into the vat, to squeeze out the whey. The vat being filled as full and as firmly as the hand alone can fill it, and rounded up in the middle, a cheese cloth is spread over it, and the curd is turned out of the hoop into the cloth; the vat is then washed, and the inverted mass of curds, with the cloth under it, is returned into the vat and put into the press; after standing two or three hours in the press, the vat is taken out, and the cloth is taken off, washed, and put round the cheese, and it is replaced in the vat and in the press. In about seven or eight hours it is taken out of the press and salted, the cheese is placed on a board, and a handful of salt is rubbed all over it, and the edges are pared off if necessary; another handful of salt is strewed on the upper side, and as much left as will stick to it; afterwards it is turned into the bare vat without a cloth, and an equal quantity of salt is added to it, and the cheese is returned into the press; here it continues one night, and the next morning it is turned in the vat, and continues till the succeeding morning, and the curd is taken out and placed on the dairy shelf: here they are turned every day or every other day, as the weather may be. If it is hot and dry, the windows and door are kept shut; but if wet or moist, the door and windows are kept open night and day.'

Cleaning the Cheese. 'The cheeses having remained about ten days after leaving the press, are to be washed and scraped in the following manner: a large tub of cold sweet whey is placed on the floor, the cheeses are immerged in it, where they continue one hour, or longer, if necessary, to soften the rind. They are then taken out and scraped with a common case-knife, with great care, so as not to injure the tender rind, till every part of the cheese is smooth; they are after the last operation rinsed in the whey and wiped clean with a coarse cloth, and placed in an airy situation to dry, after which they are placed in the cheese room. The floor of the cheese room is generally prepared by rubbing it with bean or potato tops, or any succulent herb, till it appears of a black wet color. On this floor the cheeses are placed, and turned twice a week; their edges are wiped hard with a cloth once a week, and the floor is cleansed and rubbed with fresh herbs once a fortnight. They must not lie too long or they will stick to the floor. This preparation of the floor gives the cheese a blue coat, which is considered of great consequence.

Stilton Cheese, how made. 'The Stilton cheese, which may be called the Parmesan of England, is not confined to Stilton and its vicinity, for many farmers in Huntingdonshire, and also in Rutland and Northamptonshire, make a similar sort, sell them for the same price, and give them the name of the Stilton cheeses.

'Take the night's cream and put it into the morning's new milk with the runnet; when the curd is separated, let it not be broken, as is done with other cheese, but take it out, disturbing it as little as possible, and suffer it to dry gradually in a sieve; and as the whey separates, compress it gradually till it has acquired a firm consistence; then place it in a wooden hoop, and suffer it to dry very gradually on a board, taking care at the same time to turn it daily with close binders round, and which must be tightened as the cheese acquires more solidity.

Cheese, Skippers in. 'Wrap the cheese in thin brown paper, so thin that moisture may strike through soon; dig a hole in good sweet earth about two feet deep, in which the cheese must be buried about thirty-six hours, and the skippers will be found all on the outside of the cheese; brush them off immediately, and you will find your cheese sound and good.

To prevent Cheese having a rancid nauseous flavor. 'Put about one table-spoonful of salt to each gallon of milk, when taken from the cows in the evening, for the cheese to be made the next day; put the salt at the bottom of the vessel that is to receive the milk; it will increase the curd, and prevent the milk from growing sour or putrid, the hottest nights in the summer.'—*Massachusetts Agricultural Repository.*

[The following is from the pen of a friend, to whom we are indebted for several valuable articles, written expressly for this work.]

'*To make Cheese.* A person whose dairy enjoys a high reputation gives the following directions for making cheese:

"Take a gallon and a half of water and throw into it a pint and a half of common salt. Boil and skim it, and add three or four ounces of rose leaves. After it is sufficiently steeped, let it cool, and put in one ounce of saltpetre and four runnets. A great spoonful of this preparation is enough to turn fifteen gallons of milk. When the curd is made, dip it out carefully, and put it into a cloth that sits in a vessel with its bottom perforated with holes. Let a person on each side of the cloth take up the corners. and raise the curd carefully, and turn it from one side to the other in the cloth, in order to the better draining off the whey; then lay it as before, in a vessel perforated with holes, and thus turn it once in fifteen or twenty minutes, and in the intervals place a follower upon it, with a stone above; cutting the curd through each time. When the whey is out, season it with salt to suit your palate, while cutting it up in small pieces with a suitable knife; then put it up for pressing. Let it stand under thirty or forty pounds' weight twenty-four hours, and then turn it, and let it stand twenty-four hours more under the same. A severe pressure, which is sometimes given, spoils a rich cheese entirely.'

"Set your cheese in closets made for the purpose, which flies cannot enter.

"The outside may be rubbed with a mixture of butter and Spanish brown, which answers very well, but other mixtures may answer equally well.

"A small quantity of otter, say the size of a kernel of rye, *sewed up in a cloth*, may be put in each curd.

"Never wash out your cheese cloth with soap, but boil it out in whey." '

HEMP. The following essay on the culture of Hemp was originally published in the *Western Agriculturist.* It is a complete treatise on the best manner of raising and preparing an article, which always commands cash sufficient to reward liberally the cultivator who proceeds correctly in obtaining this valuable product. The author of the essay is not less favorably known as a statesman than as a practical and scientific agriculturist, and the signature of HENRY CLAY will give it that weight and currency with American farmers which is due to its intrinsic excellence.

SIR, Having promised you some account of the method of cultivating and preparing hemp in this state, I now proceed to redeem it. I shall endeavor to describe the general practice of the cultivators, without noticing all the deviations of particular individuals.

The district of country in which the plant is most extensively cultivated, is the Elkhorn region around and near Lexington, which derives its name from a stream discharging itself into the Kentucky river, whose branches are supposed to resemble the horns of the elk. It is also produced in considerable quantities in the counties of Jefferson, Shelby, Mercer, Madison, Clarke, Bourbon, and Mason. The soil of that region is a rich, deep, vegetable loam, free from sand and with but little grit. It lies on a bed of clay, interspersed with small fragments of iron ore, and this clay in its turn reposes on a mass of limestone lying many feet in depth in horizontal strata. The surface of the country is generally undulating. The rich land (and there is but little that is not rich) in this whole region is well adapted to the growth of hemp, where it has not been too much exhausted by injurious tillage. The lands which produce it best are those which are fresh, or which have lain some time in grass of clover. Manuring is not yet much practised. Clover is used in lieu of it. Lands which remain in clover four or five years without being too constantly and closely grazed, recover their virgin fertility. The character of the soil in the other counties above mentioned does not vary materially from that in the Elkhorn district.

The preparation of the ground for sowing the seed is by the plough and horses, until the clods are sufficiently pulverized or dissolved, and the surface of the field is rendered even and smooth. It should be as carefully prepared as if it were for flax. This most important point, too often neglected, cannot be attended to too much. Scarcely any other crop better rewards diligence and careful husbandry. Fall or winter ploughing is practised with advantage; it is indispensable in old meadows, or old pasture grounds, intended for producing hemp.

Plants for seed are ordinarily reared in a place distinct from that in which they are cultivated for the lint. In this respect, the usage is different from that which is understood to prevail in Europe. The seeds which are intended to reproduce seeds for the crop of the next year, are sowed in drills about four feet apart. When they are grown sufficiently to distinguish between the male and female stalks, the former are pulled and thrown away, and the latter are thinned, leaving the stalks separated seven or eight inches from each other. This operation is usually performed in the blooming season, when the sexual character of the plants is easily discernible; the male alone blossoming, and, when agitated, throwing off farina, a yellow dust or flour, which falls and colors the ground, or any object that comes in contact with it. A few of the male plants had better be left, scattered through the drill, until the farina is completely discharged, for an obvious reason. Between the drills a plough is run sufficiently often to keep the ground free from weeds and grass; and between the stalks in each drill the hoe is employed for the same object. The seed plants are generally cut after the first smart frost, between the 25th September and the middle of October, and carried to a barn or stack-yard, where the seeds are easily detached by the common flail. They should be gathered after a slight, but before a severe frost; and, as they fall out very easily, it is advisable to haul the plants on a sled, and, if convenient, when they are wet. If transported on a cart or wagon, a sheet should be spread to catch the seed as they shatter out. After the seeds are separated, the stalks which bore them being too large, coarse, and harsh, to produce lint, are usually thrown away; they may be profitably employed in making charcoal for the use of powder-mills. In Europe, where the male and female plants are promiscuously grown together in the same field, both for seeds and for lint, the male stalks are first gathered, and the female suffered to remain growing until the seeds are ripe, when they are also gathered; the seeds secured and lint obtained, after the rotting, from both descriptions.

After the seeds are threshed out, it is advisable to spread them on a floor, to cure properly and prevent their rotting, before they are finally put away for use the next spring. Seeds are not generally used unless they were secured the fall previous to their being sown, as it is believed they will not vegetate if older; but it has been ascertained that when they are properly cured and kept dry, they will come up after the first year. It is important to prevent them from heating, which destroys the vegetating property, and for that purpose they should be thinly spread on a sheltered floor.

The seeds, whether to reproduce seeds only, or the lint, are sowed about the same time. Opinions vary as to the best period. It depends a good deal upon the season. The plant is very tender when it first shoots up, and is affected by frost. Some have sowed as early as the first of April; but it is generally agreed, that all the month of May, and about the 10th of it especially, is the most favorable time. An experienced and successful hemp grower, in the neighborhood of Lexington, being asked the best time to sow hemp, answered, immediately before a rain. And undoubtedly it is very fortunate to have a moderate rain directly after sowing.*

When the object is to make a crop of hemp, the seeds are sown broad-cast. The usual quantity is a bushel and a half to the acre; but here again the farmers differ, some using two bushels or even two and a half. Much depends on the strength and fertility of the soil, and the care with which it has been prepared, as well as the season. To these causes may be ascribed the diversity of opinion and practice. The ground can only sustain and nourish a certain quantity of plants; and if that limit be passed, the surplus will be smothered in the growth. When the seeds are sown, they are ploughed or harrowed in; ploughing is best in old ground, as it avoids the injurious effect of a beating rain, and the consequent baking of the earth. It would be also beneficial subsequently to roll the ground with a heavy roller.

After the seeds are sown, the labors of the cultivator are suspended, until the plants are ripe, and in a state to be gathered; every thing in the intermediate time being left to the operations of nature. If the season be favorable until the plants are sufficiently high to shade the ground, (which they will do in a few weeks, at six or eight inches' height,) there is strong probability of a good crop. When they attain that height, but few articles sustain the effect of bad seasons better than hemp.

It is generally ripe and ready to be gathered about the middle of August, varying according to the time of sowing. Some sow at different periods, in order that the crop may not all ripen at the same time, and that a press of labor in rearing it may be thus avoided. The muturity of the plant is determined by the evaporation of the farina, already no-

* [Would it not be well to soak the seed in water a few hours previous to sowing? We have found this to answer nearly as good a purpose as rain after sowing, with all seeds with which we have tried it. The vegetation of mangel-wurtzel is wonderfully accelerated by it.—*Ed. Am. Farmer.*]

ticed, and the leaves of the plant exhibiting a yellowish hue: it is then generally supposed to be ripe, but it is safest to wait a few days longer. Very little attentive observation will enable any one to judge when it is fully ripe. In that respect it is a very accommodating crop, for if gathered a little too soon, the lint is not materially injured, and it will wait the leisure of the farmer some ten days or a fortnight after it is entirely ripe.

Two modes of gathering the plants are practised, one by pulling them up by the roots, an easy operation with an able-bodied man, and the other by cutting them about two inches (the nearer the better) above the surface of the ground. Each mode has its partisans, and I have pursued both. From a quarter to a third of an acre is the common task of an average laborer, whether the one or the other mode is practised. The objections to pulling are, that the plants with their roots remaining connected with them, are not afterwards so easily handled in the several operations which they must undergo; that all parts of the plant do not rot equally and alike, when exposed to the dew and rain; and, finally, that before you put them to the brake, when the root should be separated from the stalk, the root drags off with it some of the lint. The objection to cutting is, that you lose two or three inches of the best part of the plant nearest the root. Pulling, being the most ancient method, is most generally practised. I prefer, upon the whole, cutting; and I believe the number who prefer it is yearly increasing. When pulled, it is done with the hand, which is better for the protection of an old leather glove. The laborer catches twenty or thirty plants together, with both hands, and by a sudden jerk draws them without much difficulty. The operation of cutting is performed with a knife, often made out of an old scythe, resembling a sickle, though not so long, but broader. This knife is applied much in the same way as the sickle, except that the laborer stoops more.

Whether pulled or cut, the plants are carefully laid on the ground, the evener the better, to cure; which they do in two or three days, in dry weather. A light rain falling on them whilst lying down is thought by some to be beneficial, inasmuch as the leaves, of which they should be deprived, may be easier shaken off or detached. When cured, the plants are set up in the field in which they were produced, in shocks of convenient size, the roots or butt ends resting on the ground, and the tops united above by a band made of the plants themselves. Previous to putting them up in shocks, most cultivators tie the plants in small hand bundles of such a size as that each can be conveniently held in one hand. Before the shocks are formed, the leaves of the plants should be rapidly knocked off with a rough paddle or hooked stick. Some suffer the plants to remain in these shocks until the plants are spread down to be rotted. Others, again, collect the shocks together as soon as they can command leisure, (and it is clearly best,) and form them into stacks. A few farmers permit these stacks to remain over a whole year, before the plants are exposed to be rotted. I have frequently done it with advantage, and have at this time two crops in stalks. By remaining that period in stalks, the plants go through a sweat, or some other process, that improves very much the appearance, and, I believe, the quality of the lint, and this improvement fully compensates the loss of time in bringing it to market. The lint has a soft texture and a lively hue, resembling water rotted hemp; and I once sold a box of it in the Baltimore market at the price of Russia hemp. In every other respect, the plants are treated as if they were not kept over a year.

The method of dew rotting is that which is generally practised in Kentucky. The lint so spread is not so good for many purposes, and especially for rigging and ships, as when the plants have been rotted by immersion in water, or, as it is generally termed, water rotted. The greater value, and consequently higher price, of the article prepared in the latter way, has induced more and more of our farmers every year to adopt it; and if that prejudice were subdued, which every American production unfortunately encounters when it is first introduced and comes in contact with a rival European commodity, I think it probable that in a few years we should be able to dispense altogether with foreign hemp. The obstacles which prevent the general practice of water rotting are, the want of water at the best season for the operation, which is the month of September; a repugnance to the change of an old habit; and a persuasion, which has some foundation, that handling the plants after their submersion in water during that month is injurious to health. The first and last of these obstacles would be removed by water rotting early in the winter, or in the spring. The only difference in the operation, performed at those seasons and in the month of September, would be, that the plants would have to remain longer in soak before they were sufficiently rotted.

The plants are usually spread down to be dew rotted from the middle of October to the middle of December. A farmer who has a large crop on hand puts them down at different times for his convenience in handling and dressing them. Autumnal rotting is more apt to give the lint a dark and unsightly color than winter rotting. The best ground to expose the plants upon is meadow or grass land, but they are not unfrequently spread over the same field on which they grow. The length of time they ought to remain exposed depends upon the degree of moisture and the temperature of the weather that prevail. In a very wet and warm spell five or six weeks may be long enough. Whether they have been sufficiently rotted or not is determined by experiment. A handful is taken and broken by the hand or applied to the brake, when it can be easily ascertained, by the facility with which the lint can be detached from the stalk, if it be properly rotted. If the plants remain on the ground too long, the fibres lose some of their strength, though a few days longer than necessary, in cold weather, will not do any injury. If they are taken up too soon, that is, before the lint can be easily separated from the woody part of the stalk, it is harsh, and the process of breaking is difficult and troublesome. Snow rotting, that is, when the plants, being spread out, remain long enough to rot, (which however requires a greater length of time,) bleaches the lint, improves the quality, and makes it nearly as valuable as if it had been water rotted.

After the operation of rotting is performed, the plants are again collected together, put in shocks or stacks, or, which is still better, put under a shed or some covering. When it is designed to break and dress them immediately, they are frequently set up against some neighboring fence. The best period for breaking and dressing is in the months of February and March, and the best sort of weather frosty nights and clear thawing days. The brake cannot be used advantageously in wet or moist weather. It is almost invariably used in this state out of doors and without any cover; and to assist its operation, the laborer often makes a large fire near it, which serves the double purpose of drying the plants and warming himself. It could not be used in damp weather in a house without a kiln or some other means of drying the stalks.

The brake in general use is the same hand brake which was originally introduced and has been always employed here, resembling, though longer than, the common flax brake. It is so well known as to render a particular description of it, perhaps, unnecessary. It is a rough contrivance, set upon four legs, about two and a half feet high. The brake consists of two jaws with slits on each, the lower jaw fixed and immovable, and the upper one movable, so that it may be lifted up by means of a handle inserted into a head or block at the front end of it. The lower jaw has three slats or teeth, made of tough white oak, and the upper two, arranged approaching to about two inches in front, and in such manner that the slats of the upper jaw play between those of the lower. These slats are about six or seven feet in length, six inches in depth, and about two inches in thickness in their lower edges; they are placed edgewise, rounded a little on their upper edges, which are sharper than those below. The laborer takes his stand by the side of the brake, and grasping in his left hand as many of the stalks as he can conveniently hold, with his right hand he seizes the handle in the head of the upper jaw, which he lifts, and throwing the handful of stalks between the jaws, repeatedly strikes them by lifting and throwing down the upper jaw. These successive strokes break the woody or reedy part of the stalks into small pieces or shoes, which fall off during the process. He assists their disengagement by striking the handful against a stake, or with a small wooden paddle, until the lint or bark is entirely clean, and completely separated from the woody particles.

After the above operation is performed, the hemp may be scutched, to soften it, and to strengthen the threads. That process, however, is not thought to be profitable, and is not therefore generally performed by the grower, but is left to the manufacturer, as well as that of beating and hackling it. Scutching is done by the laborer taking in his left hand a handful of the lint, and grasping it firmly, then laying the middle of it upon a semicircular notch of a perpendicular board of the scutching frame, and striking with the edge of the scutch that part of the lint which hangs down on the board. After giving it repeated strokes, he shakes the handful of lint, replaces it on a notch, and continues to strike and turn all parts of it, until it is sufficiently cleansed, and the fibres appear to be even and straight.

The usual daily task of an able-bodied hand at the brake is eighty pounds' weight; but there is a great difference not only in the state of the weather and the condition of the stalks, produced by the greater or less degree in which they have been rotted, but in the dexterity with which the brake is employed. Some hands have been known to break from one hundred and fifty to two hundred pounds per day. The laborer ties up in one common bundle the work of one day, and in this state it is taken to market and sold. From what has been mentioned, it may be inferred, as the fact is, that the hemp of some growers is in a much better condition than that of others. When it has been carelessly handled or not sufficiently cleansed, a deduction is made from the price by the purchaser. It is chiefly bought in our villages, and manufactured into cotton bagging, bales, and other kinds of untarred cordage. The price is not uniform. The extremes have been as low as three and as high as eight dollars for the long hundred, the customary mode of selling it. The most general price during a term of many years has been from four to five dollars. At five dollars it compensates well the labor of the grower, and is considered more profitable than any thing else the farmer has cultivated.

The most heavy labor in the culture of hemp is pulling or cutting it, when ripe, and breaking it when rotted. This labor can easily be performed by men. Various attempts have been made to improve the process of breaking, which is the severest work in the preparation of hemp. A newly-invented machine was erected for that purpose on my farm six or eight years ago, to dress hemp by dispensing with rotting altogether, similar in structure to one which was exhibited about the same time at Columbus, during the sitting of the Ohio legislature. It was worked by horse power, and detached the lint tolerably well, producing a very fine looking article, equalling in appearance Russia hemp. A ton of it was sold to the navy department, which was manufactured into rigging for the ship of the line the North Carolina, prior to her making a voyage of three years in the Mediterranean. Upon her return, the cordage was examined and analyzed; and although its exterior looked very well, it was found, on opening it, to be decayed and affected somewhat like the dry rot in wood. I considered the experiment decisive; and it is now believed that the process of water or dew rotting is absolutely necessary, either before or after the hemp has been to the brake. There is a sappy or glutinous property of which it should be divested, and that is the only process that has been hitherto generally and successfully employed to divest it.

An ingenious and enterprising gentleman in the neigborhood of Lexington has been, ever since the erection of the above-mentioned machine, trying various experiments, by altering and improving it, to produce one more perfect, which might be beneficially employed on rotted hemp, to diminish the labors of the brake. He mentioned the other day that all of them had failed; that he had returned to the old hand brake, and that he was convinced that it answered the purpose better than any substitute with which he was acquainted. I observe Mr. H. L. Barnum has recently advertised a machine which he has constructed for breaking and dressing hemp and flax, which can be procured at the establishment of Mr. Smith, in Cincinnati. I most cordially wish him success; but the number of failures which I have witnessed, during a period of thirty years, in the attempt to supersede manual labor by the substitution of that of machines, induces me to fear that it will be long before this desideratum is attained.

The quantity of net hemp produced to the acre is from six hundred to one thousand weight, varying according to the fertility and preparation of the soil and the state of the season. It is said that the quantity which any field will produce may be anticipated by the average height of the plants throughout the field. Thus, if the plants will average eight feet in height, the acre will yield eight hundred weight of hemp; each foot in height corresponding to a hundred weight of the lint.

Hemp exhausts the soil slowly, if at all. An old and successful cultivator told me that he had taken thirteen or fourteen successive crops from the same field, and that the last was the best. That was probably however owing to a concurrence of favorable circumstances. Nothing cleanses and prepares the earth better for other crops (especially for small grain or grasses) than hemp. It eradicates all weeds, and when it is taken off, leaves the field not only clean, but smooth and even.

The rich lands of Ohio. Indiana, and Illinois, are, I have no doubt, generally well adapted to the cultivation of this valuable plant; and those states enjoy some advantages for the cultivation of it which this does not possess. Their streams do not dry up as much as ours, and they consequently employ better than we can the agency of water in the preparation of it. Their projected canals, when completed, will admit of its being carried to the Atlantic capitals at less expense in the transportation than we can send it. On the other hand, the unfortunate state of slavery among us gives us, at present, probably a more certain command of labor than those states have.

FLAX. The following observations on this subject are extracted from 'Essays on Flax Husbandry. By S. W. Pomeroy, Esq., First Vice-President of the Massachusetts Society for Promoting Agriculture.'

Change of Seed. Notwithstanding it is an opinion well established among experienced flax growers in this country, that a change of seed is advantageous, it is apprehended that they are not aware of the extent of the benefit to be derived by selecting seed from a soil or climate essentially different; and it may be owing to a want of attention in this particular, that the flax crops are so uncertain, and the quality inferior, however perfect in other respects the system may be conducted. Mr. Young observes that 'foreign flax-seed was universally used in Ireland, when it could be obtained; otherwise they were careful to procure seed which grew upon soil of an opposite quality from that which was to be sown; 'that American seed was to be preferred, and produced finer flax than any other.' Baltic seed produced more, but of a coarser quality. It is well known that American seed always bears the highest price in the Irish market.

Mr. Pomeroy cites a number of examples to show the importance attached to the culture of flax in Europe, 'and to justify the conclusion that in this country a continued, judicious change of seed will be indispensable to the successful prosecution of flax husbandry; and a farther inference may be drawn, that experiments on various soils, with seed the growth of different climates, are requisite to direct the farmer to the quarter from whence his best seed may be obtained. Here opens a legitimate field for our numerous agricultural societies to labor in: on their exertions the farmer must depend in the outset; but let it once be ascertained that Riga seed is best in one section, Dutch or German in others, and mercantile interest, if not patriotism, will distribute them.

'Should it be objected to importing seed on account of the expense, we reply that large quantities of linseed oil are constantly imported, and the difference of price between our own seed and that imported will not much exceed what is now paid for good clean seed for sowing or export, and that which is sold for crushing; but if it is fifty cents per bushel, or more, it can be no object, compared with the advantages that may be reasonably expected to result; and the farmer need not be told, that "in all his operations parsimony is never so ill judged as when it is exercised in the selection of his seeds." It is not pretended, however, but that, from the great variety of soil and climate in the United States, the object in view might be obtained without importation; yet it may be important to have a good stock to begin with, when trials could be instituted with its produce. At any rate, it cannot be expected that individuals will embark in such a course of experiments, either with foreign or domestic seed, unless encouraged by agricultural societies, or other public bodies.'

In speaking of the soils most suitable for flax, Mr. Pomeroy observes, 'The soils which rank first in this country are the flat bottoms that are covered by the fall and spring floods, which subside early enough in the season to get in a crop; those river flats on the second banks that have a depth of strong alluvial soil; the reclaimed marshes and swamps, with a black unctuous soil, not too peaty, with as much clay in the composition as will permit its being rendered soon dry and mellow, and not retain water on or near the surface; if it stands two feet below, so much the better, but it must be well guarded by ditches and dykes against sudden freshets. Such is the soil of the province of Zealand, where more flax is raised, and of better quality, than in any other part of Holland. The next in estimation are the strong black loams on clay or hard pan, that will retain moisture. Yellow loams, with a holding subsoil, may be rendered suitable for flax by proper cultivation; and since the discovery that plaster of Paris is an excellent manure for it, a crop may be obtained with much more certainty on lighter land than formerly. Perhaps the characteristic of best garden mould may be applied to a flax soil, viz., retaining sufficient moisture, and all that falls, without ever being saturated; but on any soils the surface should be completely pulverized, and never be worked when wet.

'No dung should be applied to the land when the flax is sown, but may be put on bountifully with the previous crop. The objection is, that dung forces the growth so rapidly, that the plants draw weak, have a thin harl, and are the more liable to lodge. Lime, marl, shells, leached ashes, &c. do not produce such effects. Top-dressings, soon after the plants appear, of plaster, ashes, soot, &c., are highly beneficial, as they not only encourage the growth, but are a protection against worms, which sometimes attack young plants, and may be considered the only enemy they have except weeds.

'Salt has been mentioned by the late Dr. Elliot, of Connecticut, as an excellent manure to plough in with flax, at the rate of five bushels to the acre;* probably more would be better. Plaster is now much used in Duchess county, the best cultivated district in New York, as a manure for flax, on which its good effects are as apparent as on corn.

'The late chancellor Livingston viewed a piece of flax on the 20th of May, 1791, belonging to a poor tenant, very injudiciously sown on a dry sandy declivity; it looked so extremely sickly that the tenant thought of ploughing it up; the chancellor gave him three bushels of plaster, which was sown the next morning before the dew was off, and had the satisfaction of seeing his tenant gather more flax from his half acre in an uncommon dry season, than was produced from any acre in the neighborhood.

'The best preparatory crops in this country at present appear to be potatoes, corn, and roots; they will most generally repay the extra manure, and, if well managed, check the production of weeds.

'The following rotations may serve as an outline subject, to be varied, and hemp or other crops introduced, as circumstances require, viz.:

No. I. *Low, cold, or reclaimed Soils.*

1st year, *Potatoes.*
2d do. FLAX, with seeds.
3d do. *Herd's grass* and *red top*, or *tall meadow oat grass*, to continue three years or more, and the course repeated.

No. II. *Strong Uplands.*

1st year, *Potatoes* or *corn.*
2d do. *Corn* or *roots.*
3d do. FLAX, with seed.
4th do. *Clover.*

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* See Elliot's Essays on Field Husbandry.

5th year, *Orchard grass* or *herd's grass*, to continue three years or more.

No. III. *Light Lands.*

1st year, *Potatoes* or *corn.*

2d do. *Corn* or *roots.*

3d do. FLAX, with seed.

4th do. *Clover*, to be mown once, the after growth to be turned in, and rye sown thick on the furrow, which may be soiled or fed in the spring by sheep or milch cows, and ploughed in for,

5th year, *Corn.*

6th do. *Spring wheat* or *barley.*

7th do. *Clover;* and the course to be pursued as before; when flax will occupy the land every seventh year. In all cases, except when hemp is substituted, the tillage crops should receive the dung.

'If the land is ploughed into beds or convex ridges, like turnpike roads, about a rod wide, especially if low and level, the crop will be much more secure from injury by heavy rains, and the grass crops will be better if it remains in that form. On any soils, fall ploughing in narrow ridges will facilitate its early working in spring, and should not be dispensed with.'

Mr. Pomeroy gives the following directions relative to *choice of seed.*

'That of the last year's growth should be obtained if possible. The usual marks of good seed are, that it be plump, oily, and heavy, of a bright brown color, sinking readily in the water, and when thrown into the fire to *crackle* and *blaze* quick. A very simple method of trial is to sprinkle it thin between two pieces of wet paper, which plunge into a hot-bed or dunghill, and in less than twenty-four hours the proportion that will vegetate can be discerned, which should be ascertained, in order to regulate the *quantity to be sown.*

'On this head no particular directions can be given, as it depends on the various qualities of soil, goodness of seed, &c. The rule for sowing small grains is *reversed;* flax requiring to be sown thickest on rich soil, as not more than one stalk is wanted from a plant. In England and Scotland never less than two, nor more than three bushels to the acre are sown. Two and a half is the most usual portion. In Flanders and Ireland seldom less than three bushels are sown, except when seed is an object. Thick sowing is to obtain fine flax. In this country it will be important at present to sow at such a rate as will insure good crops of each; and experience only can determine the exact point. It is probable that six pecks is the least, and two bushels the extent that should be sown to obtain the most profitable results, till the demand for seed is considerably lessened.'

Sowing. Mr. Pomeroy recommends sowing as early as it is possible to prepare the ground, says that it is important that the seeds should be equally distributed, and 'fortunately what has long been a desideratum is now attained. A machine for sowing small seeds broad-cast with perfect regularity has lately been invented, and performs to great satisfaction.*

Weeding. 'Weeding is considered in Europe, and by good husbandmen in this country, as necessary to secure a good crop of flax, which is a very tender plant when young, and more easily checked in its progress by weeds than any other. It is not supposed to be injured by the clover and grass sown with it: on the contrary, the Flemish farmers think them beneficial, by protecting the tender roots from drought, and keeping the weeds under. It should be carefully wed when the plants are three or four inches high; they are not then injured by the laborer going barefooted over them.

Pulling. 'This should be performed as soon as the leaves begin to fall and the stalks show a bright yellow color, and when the bolls are turned a little brown. The seed will continue to ripen afterwards. When the flax is lodged it should be pulled immediately, in any stage of its growth, or it will be entirely lost. Great care is requisite in sorting the different lengths, and keeping them separate till after the flax is hackled, or much waste will ensue in that process.

Saving Seed. 'As soon as the flax is dry enough to be put under cover, it should be rippled, as it is termed. A comb, resembling the head of a rake, but with teeth longer and nearer together, made of hickory or oak, is fastened upon a block, and the flax, taken in parcels no larger than the

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* Bennett's machine for sowing broad-cast, a description and drawing of which are given in the Memoirs of the Philadelphia Agricultural Society, vol. iv, with ample testimony of its usefulness. It is pushed forward by a man, like a wheel-barrow, and will sow more than one acre in an hour, unimpeded by wind or light rain. They are for sale at J. R. Newell's agricultural warehouse, Nos. 51 and 52, North Market street, Boston.

hands can firmly grasp, is drawn through, and the bolls rippled off; attention to sorting at the same time should be continued. The bolls are to be riddled and winnowed immediately; spread thin on a clean floor, or on sheets, in the sun, and when sufficiently dry, and beginning to open, threshed. By this method the foul seeds are completely separated with little trouble, and good clean seed is ready for an early market, often the best, without the use of expensive machinery to make it so. Here the operations of the farmer ought to end; the process of preparation being foreign to and unconnected with his other pursuits; and which has been the greatest objection to extensive flax culture. Can there be a reason why the farmer is to prepare his flax more than the hides of his cattle, which he sends to the tanner? They are both chemical processes; and to dissolve the glutinous or resinous substances by which the fibres are attached to the stem, without impairing their strength, is perhaps as critical, and requires as much care and judgment, as to extract the animal juices from the hides, and fill the pores with tannin. In short, the flax grower and flax preparer and dresser should be distinct professions. They are said to be so in Flanders and Holland, and were extensively so in Scotland, where the farmer sold his flax on the ground, or in sheaves at his barn or rick.

'The preparation of flax by steeping is very general in the great flax growing countries in Europe, but it is not quite finished in the water. It remains spread some days on the grass, which is necessary to render it soft, and give that silvery appearance so desirable. The destructive process of dew rotting is most commonly practised in this country, and when water is resorted to it is at an improper season, and the process imperfect; which is the cause of its being so harsh and brittle. Perhaps no part of the system requires such an allowance for difference of climate. In the humid atmosphere of Ireland it is not very material when it is spread; but in this climate, when exposed to a July or August sun, every drop after a shower becomes a burning-glass, and literally scorches the fibres: besides, such a highly putrid fermentation as will then take place in the water, though it separates the harl more speedily, not only injures it, but communicates a stain, that renders the process of bleaching much more tedious and expensive.

'The flax should not be put into the water till about the first of October, and remain from ten to fourteen days, according to the temperature of the weather; and should be taken out before the fibres will separate freely, spread on the grass, when the frost will very much assist the operation; and the flax exhibits a gloss and softness that it is impossible to give it otherwise. The following method of preparing hemp will apply with great force to the point under discussion. During the late war, an experienced ship-master in Connecticut, and who was also a good farmer, raised a crop of hemp. As soon as it was dry enough to be stowed away, it was put under cover, and remained till October; was then put into clear soft water, till the fibres would separate with some difficulty, when it was spread on the grass; the frost completed the operation, and when dry it was immediately secured. There was no putrid fermentation to deteriorate the harl, nor was it mildewed by being exposed to the weather, and when dressed exhibited that fine silver green hue by which the Russian hemp is distinguished;* and when worked up, was pronounced by the rope-makers to be equal to any hemp ever imported! Here is a lesson for our western brethren, that is worth more to them than mines of silver. Clear, soft, stagnant water is preferred in Europe. A canal forty feet long, six broad, and four deep, is said to be sufficient for the produce of an acre of flax, at one time. It should be formed on a clay or some holding soil, where the water from a spring or brook can be conducted in with convenience; the expense would not be great, and on most farms suitable sites may be had. May not boiling or steaming be found the most advantageous process of preparing flax? The very superior sample of thread exhibited at Brighton, in 1818, for which Mrs. Crowninshield, of Danvers, received a premium, was spun from flax prepared by boiling. It appears by the "Transactions of the Swedish Academy," that a method was practised in Sweden of preparing flax to resemble cotton, by boiling it ten hours in salt water, spreading on the grass, and frequently watering, by which it becomes soft and bleached. Boiling or steaming will not appear very formidable or expensive when we examine the subject. A box twenty feet long, six feet wide, and four deep, well constructed of stout planks, a boiler, from which a large tube extends into and communicates with the water in the box, will boil the produce of a quarter of an acre in a day; that is, if we

* The best Riga hemp supplied for the British navy is prepared by steeping; during which it is shifted three times.

allow double the room to boil in that is required for steeping. A steam pipe, instead of the tube, and having the top of the box well secured, would permit the process of steaming to go on. It is probable that by either method, spreading on the grass will be necessary to obtain soft flax. The yarns of which the sail cloth is made at Paterson are all steamed. The navy board expressly forbid their being boiled in alkaline lye, as is usual in most manufactures of linen. It is from this precaution that their canvas has the pliable, oily feeling, which so much recommends it. It should not be lost sight of, that by boiling or steaming, much time and expense will be saved in bleaching.

'In dressing,' says Mr. Pomeroy, 'our climate gives a decided advantage over Ireland, Flanders, or the north of Europe, where flax is dried on hurdles, over a peat fire, in ovens, or kilns, requiring great care in regulating the heat, to prevent injury. All this trouble and hazard is obviated by our dry atmosphere and keen north-west winds. Dr. Deane estimated the expense of dressing flax by hand at one-third of the product. I believe the present price does not vary much from his estimate. A respectable gentleman from Duchess county, New York, informed me that mills or machines, impelled by water, have been erected there, that break and completely dress the flax for a toll of one-tenth! It is said one or more of them are in operation in the western part of this state. These mills were invented in Scotland, and are now said to be brought to great perfection. They are erected in all directions in the principal flax districts in Ireland, and notwithstanding the low price and limited demand for labor, are resorted to by the poorer classes of people, the dressing by hand being mostly abandoned. There are machines in England that dress the flax immediately from the field, without any preparation whatever. An account of them may be found in the fifth volume of the Massachusetts Agricultural Journal. It appears by the report of a committee of the house of commons, that in 1817 they were in successful operation. A man and three children impelled the machines, and dressed sixty pounds a day. Should they be susceptible of the application of water or steam power in any degree proportionate, the advantage may be incalculable; but in the present inquiry, we place these machines, however desirable, entirely out of the question.

Product. 'It is not uncommon in Great Britain and Ireland to obtain eight hundred pounds of flax from an acre!

Six hundred pounds is estimated, in some districts, as an average; but it should be observed that little, if any, seed is obtained. The average crop in New England, as far as our information extends, cannot be estimated at more than two hundred pounds, and six or eight bushels of seed. (We do not include the rich bottoms on the Connecticut, and some other rivers.) Dr. Deane was of opinion, that four hundred pounds might be calculated on with proper management.

'We think that four hundred pounds of good clean flax, and eight or ten bushels of seed, may fairly be assumed as a medium crop on favorable soils, where the culture becomes such an object as to make other farming operations subservient to it, and due attention is paid to change of seed.

'Those who grow flax to any extent are of opinion that the seed, at the price it has been for some years past, pays for all the labor bestowed on the crop to the time the flax is ready to be prepared or rotted.

WHEAT. To raise good wheat is considered, both in America and Europe, as an object of prime consequence to the cultivator, and agricultural writers have of course been very voluminous on the subject. We shall select and condense some of their remarks, which appear to us of the greatest importance, and add what our own observation and experience has suggested.

Wheat is thought to be the most useful of the farinaceous plants; and as the bounty of Providence has generally decreed that those things which are most useful shall be most common, wheat accordingly will grow in almost any part of the globe. It thrives not only in temperate, but in very hot and in very cold regions: in Africa and Siberia, as well as in the United States and Great Britain. It requires a good loamy soil, not too light nor too heavy. The Memoirs of the New York Board of Agriculture, vol. ii. p. 28, state that 'wheat grows best on land which contains just as much clay as can be combined with it without subjecting the wheat to be frozen out.' And the author of that article, Mr. Amos Eaton, observes, 'Since it is the clay which absorbs and retains most of the water injurious in wheat soils, I adopted a rule for the consideration of farmers, founded on that principle, and confirmed by all the observations I have been enabled to make. *Rule.*—Wash a little of the soil in a tumbler of water, and observe the time required for it to become clear. If the time required exceeds three hours, it may be considered as liable to be injured by frost.' W. Van Dusen, a farmer of Rensellaer county, New York, says 'that if wheat be sowed the last week in August, on clay soil, it will generally resist the effect of frost in the winter, and of insects in the spring.' 'A clay soil,' according to the same work, 'having absorbed a large proportion of water, becomes cellular as the water freezes, or rises up in various protuberances, so that the roots of the wheat plant become disengaged from their hold in the soil. It is very manifest that if wheat be sowed so early that each plant may have time to extend its roots into the soil, its chance for retaining its hold will be better.' We believe that not only clay, but lime, chalk, marl, or other calcareous substance, is necessary to bring wheat to perfection, and the grounds of our belief we shall exhibit hereafter.

The Complete Farmer says, that 'the best time for sowing wheat is about the beginning of September. But if the earth be very dry, it had better be deferred till some showers have moistened the soil.' Mr. Mortimer says he has known wheat to be so musted and spoiled by laying long in the ground before rain came, that it never came up at all; to which he adds, 'that he has seen very good crops of wheat from seeds sown in July.' We should apprehend, however, that it would be necessary to feed wheat sown so early, in order to prevent its going to seed the first year, or getting too far advanced in its growth to resist the frosts of the succeeding winter. Sowing in dry ground is generally recommended for seeds; but wheat, being liable to be smutty, is commonly prepared by steeping in brine or lime, and in consequence of the steep vegetation commences; and if the seed in this state is placed in earth which is and continues for any time dry, vegetation is checked by the drought, which kills or greatly injures the seed.

Early sowing requires less seed than late, because the plants have more time, and are more apt to spread, and throw out a good number of stalks. More seed is required for poor than for rich lands, and rich land early sowed requires the least of any. Bordley's Husbandry says, 'The climate and soil of America may be believed to differ greatly from those of England respecting the growth of some particular plants. Wheat sown there two to three bushels on an acre yields great crops. Two bushels an acre sown in Maryland or Pennsylvania would yield straw without grain. In Maryland three pecks are commonly sown. I never had better crops than from half a bushel of seed wheat to an acre, in a few instances. In these instances the ground was perfectly clean and fine, after many ploughings or horse-hoeings of maize, [Indian corn,] on which the wheat was sown in September, whilst the maize was ripening. It was a clay loam highly pulverized. But because of the loss of plants at other times, I preferred to sow three pecks an acre.' 'Grain which is thin sown, says the Complete Farmer, is less apt to lodge. Every one must have observed that in places where foot-paths are made through wheat fields, by the side of the paths, where the corn is thin, and has been trodden down in winter and spring, the plants have stood erect, when most of the corn in the same field has been laid flat on the ground; an advantage proceeding from the circumstance of the stalks having more room.'

The Farmer's Assistant asserts, that 'the time for sowing wheat probably depends much on previous habit. Thus if it were sown a number of successive years by the middle of August, and then the time of sowing were changed at once to October, the crop would probably be much lighter on that account; yet, where wheat has become habituated to be sown late, it will do tolerably well. The later it is sown, however, the more seed is requisite. When early sown, a bushel to the acre is believed to be sufficient; but when sown later, a bushel and a half, or more, may be necessary.' The estimate of seed, however, should be formed not so much from the capacity of any particular measure, as from the number of grains which that measure contains. The larger and fuller the seed is, the greater quantity by measure will be required; the smaller, the less quantity. Much, therefore, must be left to the discretion of the farmer, who must take into consideration the time of sowing, the quality and preparation of the soil, as well as the plumpness or the shrivelled state of the seed wheat.

If naked summer fallows are used at all, they may as well be made preparatory to a crop of wheat. It may sometimes be expedient to suspend, for one season, the raising of crops of any sort on land which is exhausted or greatly infested with weeds; and during the summer and autumn plough and harrow it several times, and thus thoroughly subdue it. When such a process is adopted, wheat is generally the succeeding crop. The custom of naked fallowing, however, is not much approved of in modern husbandry, and that mode of preparing for wheat is rarely adopted by scientific cultivators. Sir John Sinclair says, 'The raising clean, smothering, green crops, and feeding stock with them upon the land, is not only much more profitable, as far as relates to the value of the crop substituted in lieu of a fallow, but is also a more effectual method of procuring large crops of wheat, or any other crop, which may succeed the green crop.' There is a disadvantage sometimes attending fallows, which we apprehend may be more detrimental in our climate than in that of Great Britain. Land which is kept in a light and pulverized state is liable to be washed away by violent rains, and the showers of our summer season are usually more plentiful, and fall with more impetuosity than those of England, although the mean moisture is less, and there is less rain falls in the course of the year on this than the other side of the Atlantic.

In modern tillage, wheat more usually follows clover than any other crop; and Bordley's Husbandry says, 'clover is the best preparative for a crop of wheat.' In such case, English farmers, and indeed all others who *work it right*, give but one ploughing, and harrow in the seed by passing the harrow twice in a place the same way with the furrows. Mr. Bordley directs that the operations of ploughing, harrowing, and sowing, should immediately follow each other. Mr. Macro, an eminent English farmer, says, 'From upwards of twenty years' experience I am of opinion that the best way of sowing clover lands with wheat, is to *plough the land ten or fourteen days before you sow it*, that the land may have time to get dry, and after rain to make it dress well. I am at a loss to account for the *wheat thriving better on lands which have been ploughed some time*, than it does on *fresh ploughed* lands which dress as well or better; but I have *often* tried both ways on the same lands, and always found the former answer best.' Mr. Bordley, in attempting to account for this effect, says, 'I *conjecture* that the clover plants being buried and the wheat sown at the same time, they both ferment and run into heat in the same period; the germ then shoots, and the root is extremely delicate and tender for some days; during which, the buried herbage obtains its highest degree of heat; which, added to the internal heat of the germ, may, though only slightly, check and a little injure the delicate shoots of the wheat. In sprouting barley for making malt, a little *excess of heat* in the bed checks, and a little more totally stops the sprouting or growth of the roots. Both modes give crops superior to what are produced on fallow. Farmers may well try both methods for determining which to prefer; that is, as well *immediate* sowing, on ploughing in the clover, as the method of sowing not till ten or fourteen days after having ploughed in the clover: suppose a half each way.'

We believe that wheat would flourish better if it were buried deeper than it generally is in broad-cast sowing. Our opinion is founded on the following facts, relating to the physiology of the wheat plant. 'A grain of wheat, when put into the ground at the depth of three inches, undergoes the following transformations: as soon as the farinaceous matter which envelops the frame of the young plant contained within it is softened into a milky state, a germ is pushed out, and at the bottom of that germ small roots soon follow. The roots are gathering strength, whilst the germ, by the aid of the milky fluid, is shooting upwards; and when the milk is exhausted, the roots are in activity, and are collecting nourishment for the plant from the soil itself. This is analogous to the weaning of the young of animals, which are not abandoned by the mother till they can provide for themselves. But the care of nature does not end here; when the germ has fairly got above the surface, and become a plant, *a set of upper roots* are thrown out, close to the surface of the ground, which search all the superficial parts of the soil with the same activity as the under roots search the lower parts; and that part of the germ which separates the two sets of roots is now become a channel, through which the lower roots supply the plant with the nourishment they have collected. What an admirable contrivance to secure the prosperity of the plant! Two distinct sets of roots serve, in the first place, to fix the plant firmly in the ground, and to collect nourishment from every quarter. The upper roots are appositely situated to receive all the nourishment that comes naturally from the atmosphere, or artificially as manure, to the surface; and serve the farther purpose of being the base of new stems, which are tillered up, and so greatly increase the productiveness of the plant. The excellence of the drill system in grain may be probably perceived in this explanation; for in broad-cast sowing the seeds lie very near to the surface, and in this situation it is not only more exposed to accidents arising from birds, insects, and the weather, but the two sets of roots are necessarily crowded together, so as almost to become indistinct; the plant is less firm, and has fewer purveyors collecting food for it.'*

Dr. Deane observed, that 'wheat that is sowed in autumn, a clover ley excepted, should, instead of harrowing, be covered with a shallow furrow, and the surface left rough. It will be less in danger of being killed by the frost in winter, and less injured by drying winds in the following spring. The furrows should be left without harrowing; for the more uneven the ground is the more the soil will be pulverized and mellowed by the frost.' But if the crop which succeeds the wheat crop should require a smooth bottom, the land, after sowing, must be harrowed, and should be rolled. Some husbandmen advise, when wheat is sown on a clover ley, to plough in the clover with a deep furrow, then plough in the seed wheat with a shallow furrow; and if the next crop in the rotation requires a level bottom, it will be necessary to harrow and roll the field as smooth as possible, after having ploughed in the seed.

The greatest care should be exercised with regard to the kind, quality, and preparation of seed wheat. There are many varieties of wheat, but winter wheat, in the United States, is generally distinguished by only two appellations, red wheat and white wheat, of which the latter is held in highest estimation.

In preparing your seed wheat, the first thing to be attended to is to clear it perfectly from every injurious foreign substance. 'One error here may mar our whole system, and render our skill productive of as much evil as good. On poor and worn out land the evil of sowing a mixture of impure seed with grain or grass seed would be great; but where the ground is in high order the crop is more injured; the noxious plants take firmer hold, and are more difficult to be eradicated.'† Indeed, it would be better for a farmer to pick over his seed wheat by single handfuls, and make a riddle of his fingers, than to sow cockle, darnel, tares, wild turnip seeds, and other vegetable nuisances, which are as intrusive as unwelcome, as tenacious of life as they are unworthy

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* Mr. Featherstonhaugh's Essay on the Principles and Practice of Rural Economy.

† See a communication by O. Fiske, Esq., New England Farmer, vol. i. p. 222.

of existence. The first preparation therefore should be to screen, winnow, and riddle the grain till perfectly freed from these and other improper ingredients. When this is thoroughly accomplished, washing and steeping, for the purpose of preventing smut, should meet attention. The first step in the processes to be instituted against smut, as recommended by Sir John Sinclair, is 'to run the grain *very gently* through a riddle, when not only the smut balls, but the imperfect grains, and the seeds of weeds, will float, and may be skimmed off at pleasure.' The same author enumerates as modes by which smut may be prevented, 1. The use of pure cold water and lime. 2. Boiling water and lime. 3. Water impregnated with salt. 4. Urine pickle. 5. Lye of wood ashes. 6. A solution of arsenic. 7. A solution of blue vitriol. It seems that almost any acrid, corrosive, or poisonous application will secure a clean crop, if properly used for that purpose.

Mr. Arthur Young sowed fourteen beds with the same wheat seed, which was black with smut. The first bed was sown with this wheat without washing, and had three hundred and seventy-seven smutty kernels. A bed sowed with seed washed in clean water produced three hundred and twenty-five smutty kernels; washed in lime water, forty-three do.; washed in lye of wood ashes, thirty-one do.; washed in arsenic and salt mixture, twenty-eight do.; steeped in lime water four hours, two do.; steeped in lye four hours, three do.; steeped in arsenic four hours, one do. Again, that which was steeped in lye, as before mentioned, twelve hours, had none; and that which was steeped in the same kind of lye twenty-four hours had none; that also which was steeped twenty-four hours in lime water had none; that steeped in arsenic twenty-four hours had five.

A correspondent of the New England Farmer,* (who is, we believe, a practical and scientific agriculturist, and whose statements are worthy of implicit confidence,) with the signature *Berkshire*, in giving directions for preparing seed wheat, observes: 'The only successful course is to prepare the seed about ten days before sowing-time. This is done by selecting clean and plump seed, passing it through water in a tub, about half a bushel at a time, and washing it and skimming off the matter that floats; then empty it into a basket to drain, then lay it on a clean floor and rake in two

* See New England Farmer, vol. i. p. 275.

quarts of slacked lime and one quart of plaster to the bushel, and if too dry sprinkle on water, and continue to stir it until all is covered with the lime and plaster. In this way you may proceed until you have prepared your whole seed. Let it remain in a heap one day, then spread it and move it daily, until it becomes perfectly dry; it is then fit to sow, and you may sow it if the land should happen to be quite wet.'

We shall now speak of the liability of wheat to become winter-killed. The author of Letters of Agricola states, as an objection to the cultivation of wheat in Nova Scotia, 'its liability to be thrown out in the spring, and thus subjecting the farmer to serious inconveniences, and often disappointment of a crop. Grasses are not exempt from the same hazard; and the hopes of the year are thus blasted by a cause which, in many cases, will admit of remedy, in all, of alleviation. I am not sure but sowing the wheat seed under furrow, at least four or five inches deep, in September, in order that it may extend its roots and take a firm hold of the soil before the approach of winter, and rolling it in the spring with the box heavily loaded, would obviate the evils of our climate, and enable us to cultivate that grain according to the improved modes of England. It ought to be recollected that even there, about sixty years ago, winter wheat was not of general cultivation, and the heaving of the soil was accounted a powerful obstacle to its success. In Scotland, too, during the same period, spring wheat almost universally prevailed; and her northern and bleak position was thought to be incapable of any change to the better, and utterly unfriendly to autumnal semination. The zeal and industry of British farmers, combined with their skill, have baffled all these gloomy predictions, and taught us at once to copy the example of our sires, and not to despair in the race of improvement.'

A method, according to the same author, made use of in Norfolk, England, to guard wheat against the changes and inclemency of winter and spring, is to adopt the following rotation: 'After a turnip crop, they sow barley the second year with clover seeds; the third year they cut hay, and plough down the ley, and sow their winter wheat on the matted sod. The roots of the grass bind the soil, and prevent it from heaving, which is much akin to the same effect produced by the tangled and bound surface of our new and cleared lands.' This fact may suggest another inducement to sow wheat next in rotation after clover, as has been recommended.

It is well known that our lands, where the soil is at all suitable, will produce good crops of wheat when first cleared from their native growth of wood; but after having been tilled for some years, they generally yield wheat with difficulty, and it is often found impossible to raise it by any of the modes commonly adopted for wheat culture. In most parts of Massachusetts, and in some parts of New Hampshire and Vermont, the farmers scarcely ever attempt to raise wheat, and still more rarely succeed when they do attempt it. Yet, we believe, wheat was a common and profitable crop in those places in the early period of their settlement. In process of time, however, the land became exhausted of its wheat-bearing faculty, and our farmers were forced nearly to forego its cultivation. The same variations and appearances have likewise been observed in Europe. Wheat countries, by continued cultivation, have become almost incapable of yielding wheat. The cause and remedy of this partial barrenness, this falling off, with regard to particular plants, was alike involved in obscurity, till modern discoveries in chemistry threw light on the subject. It has been found that the texture of every soil is defective unless there is a mixture of three kinds of earth, viz., clay, sand, and *lime;* and that lime, in some of its combinations, exists in wheat, both in the straw and kernel. In some soils, fertile in other respects, lime may either have no existence, or be found in very minute portions, and be soon exhausted. If lime be a necessary constituent of wheat, and is not in the soil where we attempt to raise wheat, it must be supplied by art, or wheat will not grow. Or if native lime exists in the soil in small quantities, the land may bear wheat till the lime is exhausted, and then become incapable of producing that plant, till a fresh supply of lime, marl, pulverized bones, or some other calcareous substance, is added. Mr. Young says, (Letters of Agricola, p. 299,) 'It cannot be denied, that since the plentiful use of lime has been adopted, lands in Europe will produce wheat which otherwise were incapable of bearing it;' and quotes several instances in proof of this assertion. Dr. Anderson likewise gives an account of a field which had a top-dressing of lime for the purpose of raising wheat, but the lime, by accident, was not applied to a small patch of the field, and in that patch there was no crop, while every part of the field to which the lime was applied produced wheat luxuriantly. It would be easy to adduce many more instances to prove that lime, in Great Britain, is considered not only useful, but indispensable for the production of wheat. A British farmer, we believe, rarely undertakes to raise wheat *without* the use of lime, and an American farmer as rarely undertakes to raise it with the use of that substance for manure.

If the foregoing premises are correct, it would seem not impossible, and indeed scarcely improbable, that by the judicious use of lime, or other calcareous substances, wheat may be as well raised in New England as in the western states. The subject is certainly of very great importance, and deserves repeated experiments.

It will be objected against the use of lime, 1st, that it is too dear to be used for manure; and, 2dly, that our farmers do not know how to apply it, and, as it is a powerful substance, it may do more harm than good, unless in the hands of a chemist, or one practically acquainted with its operation. With regard to the dearness of lime, we are informed that there is no want of limestone in almost every part of the United States; and probably, by proper search, many more limestone quarries might be discovered in New England than are at present known. And the price of lime would, doubtless, be diminished by increasing the demand, because if great quantities were wanted for agricultural purposes, a greater number of persons would find their account in making a business of manufacturing it; improvements would be introduced in the processes connected with its manufacture, and of course it would be afforded cheaper. Besides, small quantities would alone be needed for the purpose of furnishing that calcareous matter which nature inclines to incorporate into the substance of wheat, clover, &c., and probably a top-dressing of two or three bushels to the acre would be of essential benefit, though doubtless more would, generally, be preferable. Mr. Young says 'a small quantity of quicklime scattered on the surface of lands newly cleared will prove highly beneficial during the whole length of time they remain untilled. Thirty bushels of shells [lime fresh from the kiln] to the acre, slacked into a fine powder, will produce the most surprising effects, if not on the first crop of wheat, at all events, on the verdure, luxuriance, and quality of the future pasture.'* A writer in the *Museum Rusticum*, an

* Letters of Agricola.

English work, says, 'that he sows his wheat without laying on any manure, but, early in the spring, gives a top-dressing of twenty bushels of lime, pulverized, and mixed intimately with forty bushels of sand; and if the weather be dry, he doubles the quantity of sand.' We are disposed to believe that at least lime enough for light top-dressings might be easily procured by almost every cultivator in the Union. And such light dressings, if our theory is correct, would be all that is *indispensable* to the production of wheat.

With regard to the mode of applying lime, nothing can be more simple. It should be evenly spread, after being water slacked, on the surface of the soil, and not ploughed in, or, if ploughed in, it should be with a very shallow furrow, because its tendency is to sink below the reach of cultivation. If used in a quick or burning state, it will be safest to mix it with about double its quantity of sand, loam, clay, or some other material. The additional material may be made to correspond with the wants of the soil to which it is applied. Thus, if the soil has too much clay, mix sand with your lime; if too much sand, mix finely pulverized clay, &c.

It is said that British farmers apply lime in great quantities directly from the kiln in its most caustic state, even to land which is replete with putrescent or vegetable manure, and run the risk of consuming or wasting the manure by its corrosive qualities. But the soil of Great Britain is generally wetter than ours, and of course the lime sooner becomes mild. Besides, there is a great difference in the strength of lime, and that of the United States may be, generally speaking, stronger than the English lime. In short, we should advise every farmer to use quicklime as manure, in small quantities at first, mixed with a large proportion of earth, or some other substance, *to dilute it*, and thus take care not to burn his seed, his fingers, or his growing vegetables. And with these precautions, we would make use of it for wheat *as a top-dressing in spring*. We would likewise try it mixed with wood ashes, together with earth; for we have been told by a practical farmer, that ashes and lime form a union much more valuable than either separate.

In an article on the culture of winter wheat, by R. H. Gardener, Esq., of Gardiner, Maine, the writer observes, 'The cultivation of winter wheat is preferable to that of summer on a great variety of accounts. It is sown and the ground prepared in a season of much greater leisure. One of the great disadvantages of our northern climate is the extreme shortness of our spring, so that it is difficult for our farmers to complete the work which is absolutely necessary to be done, after the frost is out of the ground, and before the season of planting is over. If, therefore, any work, as the sowing of wheat, can be advantageously postponed till the autumn, it is of great importance. The winter wheat is less liable to injury from insects than the summer; mine has never suffered from them. It affords good fall feed, and the larger quantity of roots and stubble to be ploughed in makes the land in a better state for the next crop. The grain is heavier, and the same number of pounds will yield a larger quantity of flour, and of a much superior quality. From my experience, I should recommend that winter wheat should not be sowed later than the middle of September, that the soil on which it is sowed should be of a light loam, and that about five pecks of seed be sown to the acre. I have also found the use of plaster on wheat advantageous, as also rolling the wheat, after it is well up.

To procure new varieties of wheats, (says Mr. Loudon,) the ordinary mode is to select from a field a spike or spikes from the same stalk which has the qualities sought for, such as larger grains, thinner chaff, stiffer straw, a tendency to earliness or lateness, &c.; and picking out the best grains from such ear or ears, to sow them in suitable soil, in an open, airy part of a garden. When the produce is ripe, select the best ears, and from these the best grains, and sow these; and so on, till a bushel or more is obtained, which may then be sown in a field apart from any other wheat. In this way many of the varieties of the common winter wheat have been obtained.* Other varieties have assumed their distinctive marks from having been long cultivated on the same soil and climate, and take local names, as the Hertfordshire red, Essex white, &c.

Marshall (Yorkshire) mentions a case in which a man of accurate observation, having in a piece of wheat perceived a plant of uncommon strength and luxuriance, diffusing its branches on every side, marked it, at harvest gathered it separately, and thus introduced a new and superior variety.

Jonathan Townsend, of Andover, Connecticut, gives the following directions for obtaining good crops of wheat, preceded by Indian corn.

'Select a piece of ground suitable for Indian corn and

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* See also N. E. Farmer, vol. x. p. 309.

winter grain; spread on evenly twenty common cart loads or upwards of stable and yard manure to the acre; plough it in just three inches deep and no more; harrow it lengthwise of the furrow; cross mark for the rows, three and a half feet for the small, or four feet for the large kind of corn; let the corn be properly tended, by keeping the ground loose with the plough and hoe and free from weeds; and if the season is not very unpropitious, you may calculate on a large crop. But if the ground is hard and stony, so that it cannot be ploughed shallow as above mentioned, then plough as shallow as possible, and spread on the manure afterwards and harrow it in, and proceed as above directed; the crop will not probably disappoint your expectations. As soon as the corn has become ripe, or too hard to roast, and if possible before it is touched with frost, cut it up, bind and carry it out of the field, and shock it in the usual way. If you have drawn the earth around your corn into hills, (which I would advise never to do in any case,) harrow the hills down with a heavy harrow, plough three inches deep, and spread on evenly four or five loads of well rotted manure,* and sow three pecks of good clear wheat to the acre, and plough it in with a light horse plough; and unless something disastrous happens, the summer following your garner may be filled with the finest wheat. The same directions will apply to ground planted with potatoes. I would insure a crop sown on ground thus managed for ten per cent. less than if sown on a summer fallow in the ordinary way.'

Wheat is subject to several diseases; the most common and generally injurious are mildew or rust and smut. Some writers assert that mildew is caused by a minute parasitic fungus or mushroom, which fastens on the leaves and glumes or stems of the living plant. The roots of this fungus, intercepting the sap intended by nature for the nourishment of the grain, render it lean and shrivelled, rob it of its flour, and the straw becomes black and rotten, unfit for fodder.

Mr. Butler, in *The Farmer's Manual*, says, in substance, that the rust on wheat commences in July, at the time of the filling of the kernel in the ear, when a combination of heat and moisture bring into action rich manures. and forces

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* It has generally been advised not to apply manure to a wheat crop the same year the wheat is sown, but the small quantity mentioned above would, perhaps, serve as a top-dressing, without giving too great luxuriance to the straw, and cause it to be mildewed or blasted.

into the straw, which has now finished its growth, more juices than the kernel can take up, being already filled out. These juices burst the straw, or pass through the natural pores of the stalk. When these juices come to the air, they lose by evaporation their thinner parts, become glutinous, and form the matter called rust or mildew.

Willich's Encyclopedia observes, 'Common wheat is more subject to this destructive disease than that which is bearded, *especially if the land has been newly dunged.'* Other writers, likewise, attribute this disorder to the application of fresh dung, in too great quantity.

The remedies against rust or mildew, according to Sir John Sinclair, are as follows:

1. Cultivating hardy sorts of wheat.
2. Early sowing.
3. Raising early varieties.
4. Thick sowing.
5. Changes of seed.
6. Consolidating the soil.
7. Using saline manures.
8. Improving the course of crops; and,
9. Extirpating all plants that are receptacles of rust.
10. Protecting the wheat plants by rye, tares, and other crops. The above remedies are enlarged upon by Sir John Sinclair, in *The Code of Agriculture*, but his observations are too voluminous to quote at large in this place.

Very able and instructive essays on the culture of wheat, by the Rev. Henry Colman, of Greenfield, Massachusetts, were published in the New England Farmer, vol. xii, pages 25, 49, 57, 65, 73. Mr. Colman gives in detail many experiments, some of which were made by himself. He states, in substance, that he sowed three acres of winter wheat on some of the best land in the Deerfield (Mass.) meadows. The land was green sward, turned up in the fall, rolled and harrowed, and the seed soaked in brine, limed, and sowed at the rate of two and a half bushels to the acre, on the 27th of October. One-half the field was abundantly manured, and to the other no manure was applied. The seed came up finely, and nothing could exceed the beauty and luxuriance of the growth, a greater part of the field averaging more than five feet in height.

'Above half the field, including an equal portion of the manured and that not manured, was passed over twice in the spring, after the grain had got to be six inches in height, with a light harrow drawn by one yoke of oxen; and three weeks after was subjected to the same process, according to the method practised in France, as mentioned by the late president of the New York Agricultural society, in his recent communication to that body. The effect of this was to destroy very few of the plants, and to render the growth of what remained much more luxuriant, producing such an increase of the stem and such an extension of the heads, as to attract the notice of the most casual observer, and to induce several persons, who were ignorant of the process to which it had been subjected, to inquire for the cause of the difference in the two parts of the field, and to ask if a different kind of seed had been used.

'After all, however, to my extreme disappointment, the whole field has been blasted, and I shall hardly get back the amount of the seed sown, and that in a small shrivelled grain. The crop is housed, but will scarcely repay the expense of threshing.

'Now that this result was not owing to the use of stable dung is obvious, because none was used; and in that part of the field where the blight appeared to commence, and to make most rapid progress, no manure whatever was used.

'It was not owing to the want of the specific property in the soil, as far as that is to be found in lime and slaughter-house manure, for both of these were employed; the seed was limed, and the above manure copiously applied.

'It is not to be attributed to the luxuriance of the crop, for several pieces, as I learn in my neighborhood, have suffered equally and from the same cause, when the cultivation was by no means so high.

'It is not a time of universal failure, for a good deal in this vicinity is perfectly healthy and sound, and I have already reaped on the same farm a small piece of wheat, say half an acre, on higher land, which was healthy and fair, though from the condition of the land it gave but a small product. This, however, though sowed at the same time, was ready for the sickle more than a week sooner than the other, from the drier and poorer quality of the soil.

'What then was the cause of the blast? I will not assume to decide this question, but as far as appears, it was atmospheric, occurring at a particular state of the plant, which rendered it peculiarly liable to blight. As the wheat was filling fast, we had frequent showers, and much of what we Yankees call *muggy* weather; one day in particular the air was sultry, the heat intense, and the showers frequent, with intervals of sunshine, and the earth was steaming most profusely. An intelligent farmer in my employ, accustomed to the cultivation of this grain in one of the best wheat districts in New York, remarked to me that this was very severe weather for my wheat, and that he feared I should lose it. The rust in fact appeared for the first time the next day, and rapidly extended itself over the whole field, presenting no difference either ir the manured or in the parts of the field not marured, and of course less luxuriant. Had my wheat been sown earlier, so as to have been farther advanced, it would probably have escaped the blight; had it been sown later, so as not to have been so far advanced as it was, perhaps, I should have been as fortunate; but the occurrence of such a peculiar state of the atmosphere being wholly accidental, at least as far as we are concerned, it is impossible to make any certain calculation about it.'

In the succeeding number, Mr. Colman quotes Sir John Sinclair's *General Report of the Agriculture of Scotland*, *Husbandry of Scotlan l*, a different work, by the same author, and a *Treatise on Rural Affairs*, by John Brown, of Markle, to show that wet and warm weather, when the kernel was beginning to form, had usually been accompanied with mildew in wheat, in Great Britain. In No. III, the writer states in substance, that the crops of wheat, both summer and winter, have been in this vicinity good and abundant, and on an average full twenty bushels to the acre. In the town of Northfield, Massachusetts, 'where three years since the article was scarcely cultivated, I have heard the crops of this year (1833) rated as high as seven thousand bushels. I think this must be an over-estimate; but any thing like an approach to this, or even an adequate supply for the population of the town, which is believed to be fully secured, is certainly a considerable event in our agricultural history.'

The writer states that William Pomroy, of Northfield, Massachusetts, from twenty-three acres of old meadow land, on the banks of the Connecticut, harvested more than five hundred bushels of winter and spring wheat, 'of as fine a sample as ever floated on the Erie canal. A part of it was reckone l to yield fully thirty bushels to the acre.' Most of this wheat was sowed very early, and was too forward to be injured by the sultry and foggy weather of July. One piece, however, was blighted in consequence of late sowing. He likewise states facts relative to the culture and circumstances attending crops of wheat grown by William Wells, Esq., in Shelburne, Mr. Charles Williams, of the same place; Mr. Orrin Dole, of Deerfield; Mr. Augustus Wells and John Wilson, Esq., of the same place; Dr. Hastings, captain Hastings, Mr. Morton, and major Porter, of Hatfield, Massachusetts; Mr. Ames and Hooker Leavit, Esq., of Greenfield, Massachusetts; Mr. William Russell, of Middletown, Connecticut; Mr. Jeremiah Wadsworth, of Hartford; Dr. Payne, of Worcester; and Justin Ely, Esq., of West Springfield.

Mr. Colman states that 'Early sowing, from the best observation I have made of the wheat crops which have come under my notice, from the united and decided opinion of the British wheat growers, and from many American authorities, is to be strongly advised. The reason is obvious: the wheat crop should be as far advanced in the spring as possible, that it may perfect its seed before the hot and sultry weather usual in July.'

Sir John Sinclair says, 'If a field be evidently affected [with mildew] and the progress of vegetation stopped, the only way to preserve the straw and the grain, if any has been formed, from being entirely lost, is to cut it down immediately, even though the crop should not be ripe. The straw is thus preserved, either for food or litter, and it is maintained that any nourishment in the stem will pass into and feed the grain, and make a greater return than could well be expected.'

Black Sea Wheat. Payson Williams, Esq., of Fitchburg, Massachusetts, has introduced into this country a new kind of wheat with the above appellation, which he has thus described in a communication published in the *Northern Farmer*.

The wheat mentioned by you as grown by me the past season I not only consider as a remarkable crop in quantity, fifty-five bushels and three quarters, (it being *spring* wheat,) but very excellent in quality. Its history, so far as I am able, shall be given. Three years since, my brother, captain Stephen Williams, brought me one bushel from Smyrna, which he obtained, as he informed me, from a ship while discharging a cargo of that kind of grain from the abundant shores of the Black sea; hence its name. Observing by the map that we were in about the same latitude, I made trial the first season of but one peck, (not being certain that it was spring wheat.) The product was large in *straw;* but owing to our unpropitious storms and bad weather for a wheat crop, the kernel was not so fair as the original. Nothing discouraged, however, I sowed from this product rather than the *original;* the product from which more than answered my expectation. From this last product I sowed, the 19th of last April, two bushels and a quarter on one acre of land which had potatoes grown on it the previous year, (crop, six hundred and thirteen bushels and a half.) This field, immediately previous to sowing, had been ploughed *deep* and *fine.* After the grain was harrowed in across the furrows the field was rolled in, and left from that time to putting in the sickle. I would here observe, however, that my usual custom has been to sow on about twenty bushels of good unleached wood ashes to the acre, so soon as the wheat plants are two inches in height, and in a *damp* morning, if such can be had. The value of such dressing I have considered to consist, 1st, in the caustic quality of the ashes, as it is a preventive to the ravages of the white maggot which sometimes preys at the roots of the young plants; 2d, considered as a manure or top-dressing, it no doubt contributes to the *earlier* perfecting the kernel or berry, and at the same time to a more vigorous growth of the straw.

The seed was prepared as usual, by stirring into the heap thick whitewash made from quicklime, until every kernel received a coat of the same; say one quart of unslacked lime to each bushel of wheat. I prefer lime to lye made of wood ashes, [only] on account of its whiteness, thereby rendering it easier to throw the seed (broad-cast) more evenly on the field.

The character of the soil is a deep loam, intermixed with cobble stones. Its natural forest growth had been oak, (white and red,) beech, rock maple, chestnut, and hemlock.

The character of the wheat appears to differ from our usual kinds, by the straw being much taller; (some of which was five feet ten inches in height;) and although it is what we call bearded, and the heads of two varieties, similar in appearance to our red and white, yet there is a variety, (say a sixth part perhaps,) which, notwithstanding the head is short, yet the kernels are so closely set that I have repeatedly counted over eighty kernels from one ear or head. This variety I call the *pearl*, from its clear appearance. The kernel throughout the crop was very plump and large; the straw stout as well as tall, bearing the beating of our New England storms better than any I have heretofore grown. I have not the least doubt but it will succeed well where other varieties have prospered, and have no hesitation in believing it will be a valuable acquisition for many years to come to the agricultural interests of our country; which, aside from *selfish* considerations, I most heartily reciprocate your views in wishing to advance, believing this to be the chief corner-stone of our happy republic.

In the mean time, if this contains any thing which you may think will subserve the interests of agriculture, you are at liberty to publish the same.

Your obedient servant,
PAYSON WILLIAMS.

RYE. The farmer who has it in his power to drive his business, instead of being driven by it, will do well to sow his winter rye some time between the middle of August and the middle of September. If it be sowed so early it will be less apt to winter-kill, will require less seed, the growth will be stouter, and the produce greater, other things being equal, than if the sowing was deferred till late in autumn.

Some foreign writers on agriculture assure us that winter rye and spring rye are of the same species; and the Farmer's Assistant says 'there is but one kind of rye; but this may be made winter rye or spring rye, by gradually habituating it to different times of sowing. Take winter rye, for instance, and sow it later and later each fall, and it may at length be sown in the spring, and become spring rye. On the contrary, sow spring rye very late in the fall at first, and you may gradually sow it earlier each year, until it may be sown in May, and used the first season for pasture or mowing, and then grown to perfection the second year.' The same opinion is likewise expressed in Deane's New England Farmer.

Rye is capable of being cultivated on most kinds of land, but the light sandy soils, where wheat will not thrive, are the sorts of soil on which it will, generally speaking, be found most profitable to raise this kind of produce. Sir John Sinclair observes that 'this species of grain is not so extensively cultivated in Scotland as it ought to be; (for weighty crops of it might be raised on soils of the most porous and arid nature, and upon almost pure sand along the sea-shore;) and the winter sort, without which the people living on the coasts of the Baltic could hardly be subsisted, is almost unknown. A correspondent informs me that he has had thirty-five bushels of rye per English acre on land that would not have produced twenty bushels of oats. Indeed, oats, sown along side of the rye, upon the same field, and on land as nearly as could be judged of the same quality, were scarcely worth the expense of reaping. On moorish land, rye has been found a more certain crop than oats. Mr. George Culley remarks that rye, like oats, will answer in crude soils without lime, or calcareous manures, which renders that crop peculiarly calculated for waste lands when first brought into cultivation.'

Lands which will produce tolerable crops of wheat had better be cultivated for the purpose of raising wheat than rye. And, if we may believe what English writers tell us relative to this subject, the use of lime for manure will often so far change the nature of a poor soil proper only for rye, that wheat may be made its substitute. Mr. Marshall, in his *Rural Economy of Yorkshire*, says, 'Before the use of lime was prevalent, much rye was grown on the lighter lands upon the margin of the Vale, and in the Moorlands scarcely any other crops than rye and oats were attempted. Now, rye is principally confined to the Moorland dales; and even there the alteration of soils by lime has been such that wheat has become the more prevalent crop.

'Nevertheless on light, sandy soils, rye is generally more profitable than wheat, and the bread which is made from a mixture of the two grains is here esteemed more wholesome to people in general than that which is made from wheat alone.'

When rye is sown upon light land it ripens much earlier than on a cold stiff ground, and it is said by some writers that by continuing to sow on such a soil for two or three years, it will be forwarded so much as to ripen a month earlier than that which has been raised upon strong cold ground. For this reason, those who sow their rye late will do well to provide themselves with this early seed.

Dr. Elliot informs, that if rye be sowed successively every year upon the same land, both the crop and the land will be greatly improved, insomuch that some grounds, which would yield but five bushels to the acre at first, have in time produced a crop of fifteen bushels, without the charge of manure; and Dr. Deane observed that he 'had known the same spot produce twenty crops of this grain in succession, excepting that it was planted with Indian corn once or twice, to subdue the weeds, and that the crops yearly increased instead of diminishing.' But this, it is said, will not be the case, unless the soil is naturally of a good quality, and the stubble be completely turned under immediately after reaping. If the ground is suffered to remain after harvest without being ploughed till the stubble is dried and shrivelled so that it possesses but little substance, and the seeds of weeds have had time to ripen, the crops of grain in each succeeding year will be diminished, and the weeds will take an almost exclusive possession of the soil.

The *Farmer's Assistant* is opposed to the raising of successive crops of rye, unless as much as twenty-five bushels of this grain can be yearly had from the acre; as such an annual product would probably afford a clear profit to the acre of half that number of bushels; and such a profit, he observes, in some of the lighter and in some of the harder kinds of soil is not to be despised. The same writer recommends sowing winter rye and spring rye alternately, in order that the ground might, every other year, be enriched by the application of gypsum. 'The growing crop of rye,' he says, 'receives no benefit from the application of this manure; but it quickly covers the ground with a fine sward of white clover; and as soon as the ground is thus swarded, it is in good condition for bearing any crop. Let the gypsum, therefore, be sown in the spring, on the growing crop of winter rye, and by the middle of October following the ground will be covered with white clover; turn this sward over in the latter end of the fall, and in the spring sow a crop of spring rye; and, as soon as this is taken off, turn the ground over again for a crop of winter rye; and in the spring repeat the process of manuring with gypsum, as before, for a crop of spring rye; and thus proceed with these crops alternately.'

Some sow their winter rye at the last hoeing of Indian corn, and hoe it in; and this Dr. Deane observed was a good practice when it is sown on flat land, or on a rich or heavy soil, where grain is apt to suffer by the frost of winter; for the plants of rye will be mostly on the corn hills, and so escape injury from frost; at least they will most commonly escape, or so many of them as are necessary to give a good crop. The plants that are killed will be those in the low spaces betwixt the hills.

Rye is not only a proper crop on land which is too poor to produce a good crop of wheat, but it should be sown on a soil which is *very rich*, in preference to wheat, because it is less apt to grow so rank as to lodge or blast than wheat. It is a very suitable crop for drained bogs. In the first volume of Communications to the British Board of Agriculture, page 341, in speaking of the culture of rye in Russia, it is observed that the produce from boggy lands drained and sowed with rye is upwards of forty bushels to one sowed; and they generally use a much smaller quantity of seed in sowing such lands. Another proof that rye will bear very plentiful manuring may be adduced from a case reported by Mr. L'Hommedieu, of New York, who observed, in substance, that a neighbor of his manured twenty square rods of poor, gravelly, dry soil with four thousand Menhaden fish, and sowed it with rye, at the rate of about one bushel to the acre. In the spring it was twice successively eaten off, close to the ground, by sheep breaking in, after it had acquired a height of nine inches the first time, and six inches the latter. These croppings, however, only served to make it grow thicker and stronger than before; and when harvested it produced sixteen bushels, or at the rate of one hundred and twenty-eight bushels to the acre; giving to the owner, according to the calculation of Mr. L'Hommedieu, at the rate of eighty-five dollars to the acre of clear profit.*

In the Memoirs of the New York Board of Agriculture, vol. i, page 82, it is said, 'Rye should be sowed the last week in August, or the first week in September, at the rate of about thirty-six quarts per acre; some say forty-eight quarts. But if it is not sowed at that time, it ought to be delayed until late in November, so that it may not come up until spring. A. Worthington had a good crop, which he sowed in a January snow storm. Rye raised on upland makes much better flour than that which is raised on low or damp land.'

Rye may be sown in autumn to great advantage for green fodder for cattle and sheep, particularly the latter, in the spring. Ewes and lambs will derive much benefit from it, at a time when little or no other green feed can be procured. When it is meant for this purpose it should not only be sowed early in autumn, but should be sowed thicker than when it is intended to stand for a crop of seed. Some say that it

* Transactions of the New York Agricultural Society, part 3, pp. 35, 36. This account may seem incredible, but Mr. L'Hommedieu declared that it was attested to by many credible witnesses.

may well be mowed for hay two or three times in the course of the summer; and this piece of husbandry is recommended for farmers whose lands are mostly dry or unsuitable for grass.

The quantity of seed to be sown on an acre should vary according to the soil, the time of sowing, and the purposes for which it is intended. If it be sowed in the latter part of August, or beginning of September, and is intended to remain for a seed crop, the quantity should vary from thirty-two to forty-eight quarts, according to the goodness of soil. Later sowing requires more seed, and in some cases two bushels to an acre will not be too great a quantity. Bannister's Husbandry says, 'When this grain is sown for sheep feed, it is proper to allow three bushels to the acre, for where the blade, haulm, or stalks form the primary object, a much larger proportion of seed is requisite than when the crop is meant for harvesting.'

Mr. Adams Knight, of Newbury, Massachusetts, received a premium of twenty dollars, from the Massachusetts Agricultural society, for a crop of rye, obtained as follows:

'The soil is a gravelly loam, rather dry than otherwise. The land was planted with corn in the spring of 1831, and manured in the hills with about six cords of manure to the acre, of common quality. In the month of August following, said acre was sowed with three pecks of seed, and hoed in the usual manner. In the month of August of the present year [1832] the rye was reaped and threshed, and found to measure forty-five bushels and five-eighths of a bushel. There is standing on said acre of land seventy-five apple-trees, from two to six inches through at the root.'*

The same year Mr. Gideon Foster, of Charlestown, Massachusetts, obtained thirty-eight and one-sixteenth bushels of rye from one acre, as follows:

'The land is bordering on, and near the mouth of Mystic river. The soil is principally a black loam, with clay bottom. In 1831 it was planted with potatoes, with a moderate supply of manure, and yielded an ordinary crop. The potatoes were removed the last week in September, the land well ploughed and harrowed in the usual way, with one and a half bushels of seed to the acre. I owe my success principally to the use of night manure, and to that in consequence of its being well prepared by age, and thoroughly mixed with

* N. E. Farmer, vol. xi. p. 238.

a large proportion of earth, and frequently removed by the fork and the shovel; so that in this way, being ripened for use, it went immediately (not to burn, as when applied green or new, but) to nourish and fertilize the soil. There was early in the spring of the present year spread on the field about eight cords of the above described manure. The field was harvested the latter part of August, the grain threshed soon after, and measured by the purchaser, whose certificate followed, showing the product to be sixty-one and three-fourths bushels, or thirty-eight bushels and two quarts to the acre.'*

The following is from the '*Transactions of the Essex Agricultural Society.*'

To the Trustees of the Essex Agricultural Society.

GENTLEMEN,—Having for many years past been more than commonly successful in raising large crops of winter rye by a process of cultivation which, I believe, is entirely new, I have been induced, by the suggestion of some gentlemen whose judgment I very much respect, to submit for your consideration a statement of the mode of culture, with the produce. And, that the success of the experiment this season may not appear to be altogether accidental, it will, perhaps, be as well to communicate the result of the process for the three or four previous years.

The land on which the experiment has been conducted is situated on the Merrimack, about a mile and a half east of Haverhill bridge; and came into possession of my father in 1827. The soil is a sand, approaching to loam as it recedes from the river. Perhaps the term *plain land* (by which it usually passes) will better convey an idea of the quality of the soil. It is altogether too light for grass. The crops we find most profitable to cultivate on it are winter rye, Indian corn, potatoes, and to some extent turnips. Oats might probably be raised to advantage, were it not that the land is completely filled with the weed commonly called charlick, which renders it entirely unfit for any spring crop, excepting such as can be hoed. The crops of rye on the neighboring soil of the same nature vary, I believe, from seven or eight to twelve or thirteen bushels per acre, according to the cultivation, and their approximation to the river. We usually raise on this land from thirteen to thirty bushels of Indian

* N. E. Farmer, vol. xi. p. 243.

corn per acre. Potatoes are very good in quality, but the quantity is quite small; not sufficient to be profitable, were it not that the land is very easily cultivated.

In the summer of 1827, we sowed three bushels of winter rye near the river, on about two acres of land, which produced twenty-eight bushels.

In 1828, we sowed four bushels on four acres of land running the whole extent of the plain from the river. This piece was sowed in the spring with oats; but they were completely smothered with charlick, and about the middle of June, the whole crop was mowed to prevent the charlick seeding. By about the middle of August, a second crop of charlick having covered the land, it was ploughed very carefully, in order completely to bury the charlick; and then suffered to remain until the 15th of September, when we began sowing the rye in the following manner. A strip of land about twelve yards wide was ploughed very evenly, to prevent deep gutters between the furrows, and the seed immediately sown upon the furrow and harrowed in; then another strip of the same width, and so on, until the whole was finished. We found the oat stubble and charlick entirely rotted, and the land appeared as if it had been well manured, though none had been applied to this part since it had been in our possession. The rye sprung very quick and vigorously, having evidently derived great benefit from being sown and sprouted before the moisture supplied by the decaying vegetable matter in the soil had evaporated to any considerable extent. This crop produced one hundred and thirty-three bushels.

In 1829, the charlick was suffered to grow on the land appropriated to rye, until it had attained its growth and was in full blossom. The land was then ploughed very carefully, and the charlick completely covered in. In a short time a second crop appeared, more vigorous than the first. This also was allowed to attain its growth, and then ploughed in as before. A third crop soon appeared, which of course was destroyed, when the land was again ploughed for sowing about the middle of September. This piece of land was a parallel strip running from the river, and containing two acres. Two bushels of rye were sowed. The crop presented a remarkably promising appearance, and yielded seventy-four and a half bushels.

In 1830, the land appropriated to rye included nearly all the lighter part of the soil, and owing to a pressure of business was not attended to as we could have wished. It was ploughed in the early part of the summer; but harrowing to destroy the weeds was substituted for the second ploughing. This, and the unusual blight which affected all the grain in this part of the country, led us to anticipate a small crop. It yielded, however, fifteen bushels to the acre.

The land on which the crop of rye was raised the present season had for three or four previous years been planted with Indian corn; and owing to the extent of our tillage land, we have not been able to apply more than four or five loads of manure to the acre this season. The charlick was suffered to attain its growth as usual; and on the 18th and 19th of June it was carefully ploughed in. The second crop was ploughed in on the 6th and 7th of August. On the 14th and 15th of September it was sowed in the usual manner, namely, a small strip of land was ploughed, and the seed sown immediately upon the furrow, and then harrowed in; then another strip of land was ploughed, and so on, until the whole was completed. One bushel per acre was sowed, as usual. The seed was originally obtained from a farmer in this vicinity, and I suppose is similar to that which is generally used. We have never prepared our seed in any manner, but have directed our attention solely to the preparation of the land; and to this we attribute our success. Owing to the unusual severity of the winter, the crop was considerably winter-killed, but recovered very soon in the spring, excepting in the midfurrows. There, as the land lies very level, the water settled, and so completely destroyed the rye that they continued bare the whole season. This would of course cause some diminution in the crop; perhaps a bushel or two. The rye was reaped at the usual season, and, as the weather was favorable, immediately put into the barn. The land contained one acre and thirteen rods, and yielded *forty-six bushels and three pecks: a remarkably fine sample.*

In entering a claim for your premium, I would ask your attention particularly to the process of cultivation. It is I believe entirely new, and capable of general application.

Sowing the seed immediately after the plough we consider very advantageous to the crop. The soil being then moist, causes the seed to spring immediately, and gives a forwardness and vigor to the plants, which they ever after retain.

The process of ploughing in *three* crops of weeds before the seed is sown very much enriches the soil. It would be altogether unnecessary to attempt to refute the notion, that by such a process nothing more is applied to the soil than was before derived from it. If one could not discover by the light which chemistry has shed upon the subject of agriculture sufficient *reasons* for the contrary conclusion, observation, one would think, would be sufficient to convince any intelligent man of the fact.

And here I would suggest, that I do not consider the experiment, as we have conducted it, quite complete. To render it more so, in the first place, in ploughing in the weeds, I would not turn a furrow after the dew had evaporated. I have no doubt but that a large portion of that fertilizing quality in the soil, which (during the summer months) is continually exhaled from the earth, is by the dew brought again within our reach, and it would be wise to avail ourselves of the opportunity of again burying it in the soil. And in the second place, I would by all means use a heavy roller after each ploughing. It would fill all the cavities left by the plough, and by pressing the soil more closely to the weeds, at once hasten their decomposition and very much retard the evaporation from the soil.

But the land is not only very much enriched by this process. There is, I conceive, no method by which it can be so effectually cleaned. Three times during the season a fresh surface is presented to the atmosphere; and each time, as the decaying vegetable matter increases in the soil, so is the exciting cause augmented to make a more vigorous effort. We have in this manner gone over nearly all our land which is invested with charlick, and the diminution of the weeds is quite sufficient to warrant the expectation, that in a few years it may be comparatively eradicated.

Very respectfully, JOHN KEELY.

Haverhill, Sept. 22, 1832.

OATS. The following remarks are extracted from a communication for the New England Farmer, written by Henry Stevens, of Barnet, Vermont.

'The subject which I propose is that of the more extensive cultivation of oats. Various are the kinds of oats. The barley or Scotch oats, so called, I have cultivated, but not with very great success; their weight is generally about forty-two pounds per bushel. I have seldom been able to raise more than from twenty to twenty-five bushels per acre. The black oats I have cultivated; their weight is about thirty-six pounds per bushel, and produce about as many bushels per acre as the barley or Scotch oats. The greatest objection I have to the barley or Scotch oats is, that they must be harvested suddenly after they are fit, in order to prevent waste. The common oats which are raised I consider preferable. My average crop of late years has been from forty to fifty bushels per acre, and in one instance sixty-five bushels per acre.

'I make oats principally, and generally speaking, my first crop in the line of a rotation of crops. I break up the piece intended for this crop in the fall, if possible, and in the spring cross plough and harrow thoroughly before I sow my grain; then harrow again until the turf is well pulverized; then sow ten bushels of clover seed chaff per acre, and roll it in. As soon as the grain is harvested, and the young clover has received its growth, I plough it in. This clover with the stubble is about equal to a common dressing of compost manure. In the fall plough, in the spring I cross plough, after taking from my compost heap thirty loads per acre, which are carefully spread. The lot then being well harrowed and furrowed, is ready for planting, either with corn, potatoes, or turnips. This is my second crop. For my third crop I again sow wheat, peas, flax, oats, &c., and stock the lot down with herd's grass and red top, which I believe make the best of hay. I let the lot remain in grass three years. Thus you will observe I till three years, or mow or pasture three years. My first and third crop is principally oats.

'I have frequently been told that oats and corn were very impoverishing crops; but I find no difficulty in enriching my land as above stated. Ten years ago my average crop of corn was from thirty to forty bushels per acre; but in passing over a lot the second time, which was managed as above, in the summer of 1821, I had the satisfaction of harvesting ninety-six bushels of corn per acre, and received the society's premium. My other crops have advanced in about the same proportion.

'The inquiry will naturally be made, what I do with my oats? Well, sir, after I have reserved for my stock and for seed, I take the remainder to my mill and manufacture them into flour and meal. It will be understood that the oats are kiln dried, then hulled about as clean as rice, then ground, and bolted or sifted, as the case may be. That which I bolt is calculated to be mixed with wheat flour for bread; in which case the oat flour, being kiln dried, must be scalded before it is mixed with the wheat flour, otherwise the bread will be too dry. Good oat flour, prepared as above, mixed with wheat flour, half and half, will make as light and pleasant bread as common country wheat flour, and it will trouble good judges of bread to tell it from clear flour bread. Again, it is excellent to make butter cake, by the Yankees called slapjacks. The oat-meal is calculated for puddings, and is a substitute for rye meal to mix with corn meal or rye meal for bread. In either case the oat-meal must be scalded before it is mixed.

'Thus after supplying my family, the remainder is for market. The oat flour I have generally sold in Boston and New York to the druggists. The meal is also purchased by the druggists. I have generally sold them oat flour for from four to five dollars per hundred, and the meal from three fifty to four fifty, which is by them retailed as medicine, from twelve to twenty cents per pound.

'The meal is frequently bought by foreigners, by the barrel or hundred, for family use. The sale of oat-meal is at present rather limited; the reason is that but very few people in this country, save foreigners, are acquainted with the use of it, except for medicine. Foreigners generally prefer oat-meal to flour. I really hope, both for our health and the interest of agriculture, that the time is not far distant, when oat flour and meal will be used in every family for food.

'Much may be said as to the value of this article as medicine, as well as for food. It has been a common article for food in Scotland and Ireland for many years. Seldom, if ever, an English, Scotch, or Irish vessel sailed without a supply of oat-meal; and I may say it would be well for every commander of an American vessel, in making up his order for ship stores, to include a sufficient quantity of oat-meal or flour for his voyage.'

A writer in the Massachusetts Agricultural Repository, vol. v. pp. 331–2, says, 'It appears to us best, all things considered, that the first crop, after turning over sward, should be oats. The reason why an oat crop should precede a potato crop is, that it not only pays well by its product for the year's labor, but enables the husbandman to deepen his ploughing, preparatory to the second year's series in the rotation.'

We believe that oat-meal is of more value as an article of diet than is generally supposed in this country. Loudon, in his Encyclopedia of Agriculture, in giving some notices of the agriculture of Angus, in Scotland, observes, that

'Oat-meal, when it is sufficiently diluted with any sort of liquid, is known to be laxative, aperient, wholesome, and at the same time a strengthening food for those engaged in hard labor. Engineers who superintend the excavation of canals have assured the reporter that those laborers who lived entirely on oat-meal and milk did a third more work than those who used butcher's meat and ardent spirits. All of the former saved money, while many of the latter involved themselves in debt. As this sort of work is done by the piece, it affords a fair comparison not only of the wholesomeness of oat-meal in promoting health, but its power in supplying labor.'

In harvesting oats, it is recommended to mow, instead of reaping them, as soon as they begin to turn yellow. If they are then well dried, the straw will make food for cattle, after being threshed, which will be eaten by the animals in preference to the best meadow hay.

Mr. Jacob Smith, of Duxbury, Massachusetts, is said to have raised, in 1833, the prodigious crop of *seventy-four bushels and three pecks of oats on four-fifths of an acre.* The average height of the plants at the time of harvest was estimated at five feet four inches.

BARLEY. The following is from the pen of judge Buel, of Albany.

'*The soil* for barley should be such as will grow good turnips, or other green crops, including clovers, and which embrace the varieties of loams and sands that are not wet, or *very* dry and poor. Indeed, I have taken my crops, and they have been pretty good, from my lightest turnip soils. Barley cannot be cultivated to advantage upon stiff, heavy, and wet grounds, or on such as are of a cold and tenacious quality. This crop occupies the ground but about three months; and it is only in a dry, light, mellow soil that its roots can extend with sufficient facility, and supply the food necessary to bring the grain to rapid and perfect maturity.

'*Previous Crop.* Crops that precede this grain should be such as leave the ground mellow and free from weeds; and for this reason hoed crops are to be preferred, such as turnips, potatoes, peas, beans, &c. Small grains should not precede it; they impoverish the soil, leave it foul, and, besides, it is contravening one of the most salutary maxims of husbandry to grow two dry crops in succession. It may follow clover; but if the soil is heavy, the ley should be ploughed in autumn. Barley is successfully sown upon the fallows in England, (not summer, but autumn fallows,) and is sown sometimes after wheat; but in the latter case the turnips are pulled, and previously fed upon the stubble; a practice which I think is not likely to obtain here. I have generally sown barley after ruta baga or potatoes, these crops having received a good dressing of long yard or stable manure.

'*Manure* should not be applied to the barley, but to the preceding crop. The short period that this grain occupies the ground does not afford time for the manure to decompose and yield its food to the plants; and, if applied in excess, it causes a too rank vegetation, and the straw lodges before the grain is matured. When a fallow or clover ley is employed and ploughed in autumn, dung may be previously employed and ploughed under.

'*Preparation of the Ground.* Where barley follows a root or hoed crop, one ploughing will generally suffice; but in all cases a complete pulverization of the soil is necessary; and to effect this a roller is often of material benefit. If sown upon grass leys, ploughed in autumn, the spring ploughing should be shallow, so as to leave the sod reversed. But the preferable way may be to harrow the fallow, plough in the seed with a light furrow, and smooth off with the harrow.

'*The Seed and Sowing.* Loudon enumerates six species and sub-species of the barley. The kinds uniformly cultivated here are the two, four, and six rowed spring, (*hordeum vulgare* and *hordeum distichon.*) Thin-skinned, pale, plump seed should be selected. I sow as soon as the ground is sufficiently dry in spring. The young grain is not hurt by the ordinary frosts of the latter part of April and May. I sow from six to eight pecks per acre, according to the richness of the soil and the forwardness of the season; the poorest ground and the latest sowing requiring the most seed. In England, the common quantity of seed is from eight to sixteen pecks. Our climate being much warmer than that of Great Britain, barley and other grains till better with us, and consequently we require less seed. We uniformly sow broad-cast, generally on the fresh furrow, and harrow in both ways; and those who have a roller use it in the finishing operation. It gives a smooth surface, breaks down the lumps, brings the earth in contact with the seed, and if grass seeds have been sown, its use is doubly beneficial. I steep my seeds twenty-four hours in a weak solution of nitre, the crude kind of which costs me only eight cents per pound by the quantity. From the analysis and observations of Grisenthwaite, there is reason to believe that this salt is peculiarly beneficial to the barley crop, the grain yielding it on analysis. I have made no comparative experiments, but I think this step serviceable. I have applied to this grain, as a top-dressing, with singular success, the powdered dung of pigeons and dunghill fowls, at the rate of twenty to thirty bushels the acre.

'The crop admits of no after-culture when sown broadcast. Yet the application of the roller, when the plants are two or three inches high, is no doubt salutary, especially if there have been no considerable rains. Rolling gives a salutary compression to the soil, which in the spring is apt to be loose and porous, and full of cracks, by the alternation of freezing and thawing, or of wet and dry weather; it destroys many insects; and, above all, it partially buries the crowns of the plants, and introduces a multiplication of seed stalks. I can recommend the practice from experience. When grass seeds are sown with barley, the luxuriance of the young grass sometimes chokes the grain, robs it of nutriment, and sensibly diminishes the product. To obviate this evil it has been recommended to sow the grass seeds after the barley has come up, and to cover them with a light harrow and a roller; and it is said, and I think with truth, that this operation will not materially injure the grain. In dry seasons, the crop is sometimes attacked by worms, while young. In this case the roller should be applied and sufficient weight added to require the draught of two or three cattle.

' *Time and Method of Harvesting.* When the soil is rich and the season propitious, this grain is very liable to lodge. If this happens after it has blossomed, no material injury is sustained in the product; if before, the crop is greatly diminished. This shows the danger to be apprehended from making the soil too rich, and of applying fresh manure. Barley is known to be ripe by the disappearance of the reddish cast on the ear, or what the English farmers term *red* *roan ;* by the ears beginning to droop, and bend themselves round against the stems ; and by the stalks becoming brittle, and of a yellowish color. This is the particular period for cutting, as, if suffered to stand longer, the heads break off, and the grain wastes with the slightest touch. And it may be cut with the cradle, sickle, or scythe, according to circumstances. If it stands straight, and is not too heavy, the cradle is to be preferred ; if heavy, or lodged, the sickle or scythe. But as the grain is yet soft, and the straw contains much moisture when it ought to be cut, it should be suffered to become well dried in the swath before it is bound in sheaves, or carried to the barn or stack. If cut with the cradle or sickle, it is bound in sheaves ; but the more common practice is to cut the crop with the scythe, rake the ground, and load it with the barley fork.

'Barley improves for malting by lying till October before it is threshed ; though it is often threshed immediately from the field. The great difficulty in preparing it for market is to rid it of the awns. This may be done with flails, after it has passed once through the fanning mill ; and, where it is in great quantities, it may be spread from four to six inches upon the barn floor, and trodden with horses.

'*Produce and Profits.* The average product in England is stated by Donaldson at thirty-two bushels per acre. The product in New York varies from fifteen to seventy bushels, according to season and soil ; and I think the average is somewhat short of that of Great Britain. Compared with wheat, its product is as two or two and a half to one ; compared with oats, about equal, provided the soil is adapted to this grain. It is, however, to be remembered, that neither wheat nor oats are adapted to a barley soil ; the first requiring a more stiff and tenacious and the latter a more cold and moist location. The average price of barley is at least two-thirds that of wheat. Supposing wheat, then, to be one dollar and twelve cents the bushel, and the product fifteen bushels per acre, and barley to be seventy-five cents, and the product of an acre thirty bushels, and the expense of cultivation equal, the profits of the barley will be nearly as three to two compared to wheat. Barley, besides, is a less precarious crop, is subject to fewer diseases, and has fewer insect enemies to encounter than wheat.'

A correspondent of the Bath Agricultural society writes, 'The last spring being remarkably dry, I soaked my seed barley in the black water taken from a reservoir, which constantly receives the draining of my dung heap and stables. As the light grains floated on the top, I skimmed them off, and let the rest stand twenty-four hours. On taking it from the water, I mixed the grain with a sufficient quantity of sifted wood ashes, to make it spread regularly, and sowed three fields with it. The produce was sixty bushels per acre. I sowed some other fields with the same seed dry, but the crop, like those of my neighbors, was very poor, not more than twenty bushels per acre, and mixed with green corn and weeds when harvested. I also sowed some of my seed dry on one ridge in each of my fields, but the produce was very poor, in comparison of the other parts of the field.'

MILLET. (*Panicum miliaceum.*) The stalks and leaves of this plant resemble those of Indian corn, though much smaller. It grows to the height of three or four feet. A sandy soil suits it best. It bears drought admirably well. It is said to produce as large a quantity of grain as Indian corn, when cultivated in drills three feet apart and six inches in the rows; but owing to the difficulty in saving the crop on account of birds, of its ripening unequally, and its shelling out, it is generally thought best to sow it broad-cast, and cut it when in milk for fodder.

Mr. Reeder, of Pennsylvania, sowed one peck to the acre in May, and put in four acres; cut it the middle of August, and dried it in the sun two or three days. He had seventy-five bushels of seed to the acre, and six tons of fodder on four acres. His cattle relished it very well.

It is stated in the *Plough Boy*, that millet sowed in June on good ground will give from two to four tons of fodder, and from twenty to thirty bushels of seed, equal to corn for fattening hogs. It is cultivated in Pennsylvania and Maryland as a fodder crop, and cut in the milk. It is preferred in winter by neat cattle to clover.

The *American Farmer* gives the following very flattering account of this grain. Millet sown from the first of May to the 20th of June has invariably furnished more fodder than could have been obtained from grass under similar circumstances. On the 5th of May, five bushels were sown on four acres; on the 5th of July it was harvested, and estimated at four tons per acre. It requires in all cases fine tilth, and as much strength of soil as is necessary to produce heavy oats.

A crop of fodder can be produced if sowed as late as the last of July.

Mr. N. Davenport, of Milton, Massachusetts, gives the following account of growing a crop of millet:

'From the 10th to the 23d of June, I sowed about twelve acres of millet, at about sixteen quarts per acre. About one-third was on land planted the year before, and I think produced nearly three tons per acre; the other two-thirds was on green sward, ploughed and harrowed but a few days before being sown; and on very light land, without any manure on either. I had not much over one ton per acre on the green sward, the land being so light that it did not bear more than two or three hundred of hay per acre. I mowed my millet from the 1st to the 12th of September; and I found the tops of heads perfectly ripe and fit for seed.

'I think millet well worth the attention of farmers in general for horned cattle. I believe all horned cattle prefer it to any other fodder. But I think hay for horses is better than millet.'

John Hare Powel, Esq., of Pennsylvania, has given us the following observations on the culture of this crop.

I have made many experiments on various soils, and at different seasons, to ascertain the product as well as the properties of millet. Upon light land, in good condition, it succeeds best. It requires in all cases fine tilth, and as much strength of soil as is necessary to produce heavy oats. I have not seen, either in Europe or America, any green crop which so largely rewards accurate tillage and plentiful supplies of manure, as the species of millet usually grown in this and the adjacent counties. I have sown it from the first of May to the 20th of June, and have invariably obtained more fodder than could have been had from any grass under similar circumstances. In the autumn, eighty bushels of *caustic* lime per acre were strewed upon an old sward, which was *immediately* ploughed, closely harrowed, sown with rye, and rolled. The rye was depastured in the winter and succeeding spring. Early in April the land was ploughed again; the lime and decomposed vegetable matter was thus returned to the surface. About three weeks after, it was harrowed, to destroy weeds; early in May it was again harrowed for the same purpose; within a fortnight it was stirred with Beatson's scarifier to the depth of nine inches, harrowed, sown with millet, and rolled. The crop was fairly estimated at three tons per acre. After the millet was cut, the field was stirred, and repeatedly harrowed, to destroy the after growth of noxious plants. I intend to again sow rye, not only to obtain pasturage, but to protect the soil from the exhalations of the sun. In the succeeding spring, a slight dressing of fresh manure was ploughed under; the scarifier, roller, and harrow were used at intervals as before. On the 5th of May, five bushels of millet seeds were sown on four acres; on the 5th of July the crop was hauled, and estimated at four tons per acre. I have obtained this season forty tons from sixteen acres, of which four only had been manured; the remainder could not have borne a good wheat crop. One of the loads was weighed; an account of them was regularly kept; their size was made as nearly equal as possible. I have generally used a large quantity of seed, as not more than two-thirds of that which is usually sown will vegetate. Whilst my oxen consumed millet in its green state, they performed their work with more spirit and vigor than they had done before, or have shown since, except when fed with grain. My cattle, of all ages, prefer it to both red and the best white clover, meadow, or timothy hay.

I am not disposed to cultivate it as a farinaceous crop, since I have found great difficulty in protecting it from the ravages of immense flocks of birds, which it attracts, and in securing it sufficiently early to prevent a large part of the grain from being left on the ground. The seeds on the upper parts of the stalks generally ripen and fall before those below have been filled. I therefore invariably cut it when the upper parts of most of the heads contain seeds which are hard. All my observations have confirmed me in the belief, that in this stage it affords fodder more nutritious, and more easily made, than any sort of hay. The expense of tilling the land, in the accurate manner which I have detailed, is not so great as at first view would appear. A yoke of good oxen can scarify three acres and a half, without difficulty, in one day. I would recommend millet, not merely for its value as a food, but for the means it affords of making clean the land, without summer fallows, or drill crops. The ingenious arguments which have been adduced to prove that deep stirring between growing crops is advantageous to them and the soil, are founded upon English experience, properly directed by close attention to the effects of a moist climate. Some of our writers have profoundly asserted, that as 'dew drops' are found on the under leaves of plants after deep stirring has been given in a time of great drought, the practice is sound. I should suggest, if I were allowed, that moisture had better be at such times conveyed to the roots, than be exhaled by the sun, or placed on the leaves until his rays shall have exhausted it all. The valuable parts of most manures readily assume the gaseous form; every deep stirring, to a certain extent, in *hot* weather, therefore, impoverishes the soil. Deep ploughing, at *proper* seasons, is, I conceive, the basis of all good farming. Such crops as shall enable the husbandman to extirpate weeds, and obtain large supplies of fodder, without much exhaustion, should be the great objects for his aim. I would propose that a foul sward receive its proper quantity of quicklime, which should be spread and ploughed under, in its *caustic* state, in the early part of September; that the field be harrowed sufficiently; sown with rye at the rate of two bushels per acre, as early as possible; that it be depastured late in the autumn and early in the spring; that in May it be again ploughed, three inches deeper than before; that it be harrowed, and left until the small weeds begin to appear. Early in June millet should be sown; in August the crop can be removed, after the labors of the general harvest. The field should be slightly stirred with the scarifier, occasionally harrowed, and left throughout September, for the destruction of weeds, as before. In October it may be manured, and sown with wheat, or left for a crop of Indian corn.

BUCKWHEAT. (*Polygonum.*) In light lands this crop may be raised to advantage. In this climate it should not be sown till after the middle of May. One bushel is seed enough for an acre, if sown broad-cast, as is usual; but if sown in drills, less than half that quantity is sufficient. In the state of New York, farmers sow it in August with winter wheat. It affords them a ripe crop in the fall, without injuring the crop of wheat, which grows with and succeeds it.

Buckwheat is harvested by mowing, in the manner of barley. After it is mown it should be several days before it is housed. It is in no danger of the seeds falling, nor does it suffer much by wet. From its great succulency it is liable to heat in a mow, on which account it is better to put it into small stacks of five or six loads each, than either a large one, or in a barn.

Mr. Loudon observes, 'that the use of the grain of buckwheat in Great Britain is almost entirely for feeding poultry, pigeons, and swine. It may also be given to horses, which are said to thrive well upon it; but the author of the *New Farmer's Calendar* says he thinks he has seen it produce a stupefying effect. Young says that 'a bushel of buckwheat goes farther than two bushels of oats, and mixed with at least four times as much bran, will be found sufficient for a horse a week. Eight bushels of buckwheat meal will go as far as twelve bushels of barley meal.'

The meal of buckwheat is made into thin cakes, called crumpets, in Italy, and in some parts of England. Buckwheat pancakes are likewise common, and thought to be wholesome as well as palatable, in many parts of the United States. Buckwheat blossoms afford rich food for bees, and are useful as well from the quantity of honey which they enable the bees to make, as the long time they continue without fading or ceasing to be fragrant. On this account the buckwheat plant is highly prized in France and Germany; and Du Hamel advises bee-keepers to carry their hives to fields of this crop in autumn, as well as to heath lands.

The *Farmer's Assistant* says, 'We cannot recommend the culture of buckwheat on lands which are suitable for more valuable crops; but on light smooth lands, particularly, the farmer may find his account in keeping a field of a few acres for a yearly crop of buckwheat, as well for family use as for assisting in fattening his swine, &c. A bushel of gypsum to the acre, or perhaps less, applied yearly to the ground, would be found to keep it rich enough for good crops.'

RICE. (*Oriza Sativa.*) This is a genus of plants, consisting of several species, which, however, may be divided into two varieties, viz. mountain rice, which grows in dry elevated soils, and marsh rice, sown in low swampy districts. The former kind was raised by Mr. Bordley on dry sandy land, near Annapolis, in Maryland. It is perhaps possible that this plant may be gradually introduced into the northern states, and made to grow in dry and elevated ground. This is much to be desired, as rice is the cheapest nutriment known, containing, it is said, ninety-six parts in a hundred of nutritive matter.

The Farmer's Assistant gives the following directions for the culture of this plant: 'Early in the spring, the ground is to be fitted with the plough for the reception of the seed, which is to be drilled in, in rows, at the distance of about twenty-seven inches apart. When the young plants have acquired a suitable height, the weeds are to be eradicated from the crop with the plough, or with a small harrow to be guided by handles behind, run twice between the rows, and the work is then completed by the hoe, and perhaps some hand weeding.

'In due season after this the water is to be occasionally let on the ground, for the purpose of killing the weeds and grass; and then to be let off again, in order that the crop may have such farther ploughing and hoeing as may be found necessary. If water is not used, the growing crop is to be kept clear of weeds, like other hoed crops, till the ground becomes sufficiently shaded to prevent farther trouble from them.

'The grain will be found sufficiently ripened while the stalks are still green; and on this account they are valuable as a substitute for hay. If the crop be flooded, the water is to be let off in due season, so that the ground can be laid sufficiently dry before harvesting. With regard to this operation, we will merely observe, that he who understands the manner of harvesting wheat, rye, barley, or oats, need be at no loss as to the best method of gathering this crop; remembering, however, that the straw should be sufficiently dried before threshing or stowing the crop away.'

HOPS. The following was written by William Blanchard, Jun. Esq., and first published in the *New England Farmer*, vol. ii. p. 52.

'The hop is a native plant. It is found growing spontaneously on the banks and intervals of many of our large rivers. There are several distinct species, all bearing a near affinity to each other; (I have noticed five.) At present they are cultivated together, promiscuously; no preference having been given to any particular one of them by the brewer. But I am of the opinion that there is an essential difference in their qualities; that one may be the best for pale ale, another for strong beer, and a third for porter; and I presume, ere long, particular attention will be paid to ascertain their different qualities.

'The soil best calculated for the production of hops I consider to be a sandy loam, rather low and moist. I am led to this conclusion partly from my own observation, and farther (considering nature an infallible instructer) from finding the lands which produce them naturally (intervals and the banks of large rivers) to be of this kind. Yet, I must observe, I have seen very fine crops raised on very different soils.

'I should recommend the following mode of preparing the land and managing the crop. In the fall (October) plough the land deep, nine or ten inches. In the spring following, pass a heavy, sharp iron-toothed harrow over the land in the same direction it was ploughed; after which, spread your manure evenly over the same, sixteen cords per acre, and more if the land be much reduced; then cross-plough the land nearly the same depth, and furrow it as for planting corn, the furrows to be at least four feet apart.

'It is customary to plant corn or potatoes with the hops; (I should prefer potatoes.) Plant every other hill in every other row with hops, thus placing the hop hills at least eight feet apart. Put four cuttings from the running roots, about eight inches in length, into each hill, and cover them the common depth of potatoes.

'Many yards have been much injured by being planted too closely. It is of great importance to have the hills so far distant from each other as to admit a free current of air to pass through the yard.

'All the attention requisite the first season after the hops are planted, is to keep them clean from weeds, which is easily done when hoeing the crop planted amongst them. In the fall, (October,) to prevent their being injured by the hard frosts of winter, carry on and lay out of your cart one shovelful of compost manure on the top of each hill; manure from the hogsty I should prefer.

'In each following spring, before the hops are opened, as it is termed, spread evenly over the yard about eight cords of manure per acre, (coarse, strawy manure I should prefer, as it will have a tendency to keep the land loose,) and plough the field both ways at the first hoeing. They require but three hoeings in a season, unless necessary to subdue the weeds; the last of which should be performed when the hops are in full blossom, (about the beginning of August.)

'After the first crop, it is necessary to open the hops, every spring, by the middle of May; which is performed by making four furrows between the rows, turning the furrows from the hills, and running the plough as near to the same as possible without injuring the main roots. Then the earth is removed from the roots with a hoe, all the running roots cut in, with a sharp knife, within two inches of the main roots; the tops of the main roots must also be cut in, and then the hills covered with earth about two inches deep.

'The next thing necessary to be done is to set the poles. This should be done as soon as the hop-vines begin to make their appearance. By so doing, much time and labor will be saved in tying up the vines to the poles, as many of the vines will naturally take to the poles. There should not be to exceed two vines to one pole, nor to exceed two poles to one hill, nor any pole to exceed sixteen feet in height. Many yards have been very much injured by letting a greater number of vines grow on one pole, and almost destroyed by over-poling.

'Very much depends on paying due attention, in the spring, to select the most thrifty vines, and training them to the poles, which is done by fastening them to the poles with a piece of yarn, slightly twisted together with the thumb and finger.

'It will be necessary to inspect your hop-yard frequently, until the hops begin to blossom, and "tie up the vines," as it is termed, as they are subject to be blown off the poles by every high wind.

'As soon as the hops are ripe, which is about the beginning of September, they must be immediately gathered, or the crop is lost. The quality of the hops depends considerably on their being picked clean from leaves and stems. The labor of picking or gathering the hops may be well performed by women and children, having one man to a bin to handle the poles and to inspect the pickers. The bin is a wooden box, about nine feet long, three feet wide, and two and a half feet high, made of thin pine boards, that it may be easily moved over the yard, across which the poles are laid, and into which the hops are picked by hand. Care should be taken, when gathering the hops, to cut the vines two feet from the ground, that the roots may not be injured by bleeding.

'The most important part in the management of hops is the curing or drying of them. Here I would note that hops always grow first sort, and that all second sort and refuse hops are made so by unfortunate or unskilful management.

'Much depends on having a well constructed kiln. For the convenience of putting the hops on the kiln, the side of a hill is generally chosen for its situation. Care should be taken that it be a dry situation. The kiln should be dug out the same bigness at the bottom as at the top; the side walls laid up perpendicularly, and filled in solid with stone, to give it a tunnel form. Twelve feet square at the top, two feet square at the bottom, and at least eight feet deep, is deemed a convenient size. On the top of the walls sills are laid, having joists let into them in like manner as for laying a floor; on which laths, about one and a half inches wide, are nailed, leaving open spaces between them three-fourths of an inch, over which a thin linen cloth is spread and nailed at the edges to the sills. A board about twelve inches wide is set up on each side of the kiln, on the inner edge of the sill, to form a bin to receive the hops. The larger the stones made use of in the construction of the kiln, the better; as it will give a more steady and dense heat. The inside of the kiln should be well plastered with mortar, to make it completely air tight. Charcoal (that made from yellow birch or maple I should prefer) is the only fuel proper to be used in drying hops. The kiln should be well heated before any hops are put on, and carefully attended to keep a steady and regular heat.

'Fifty pounds of hops, when dried, is the largest quantity that should be dried at one time, on a kiln of this size; and unless absolutely necessary to put on that quantity, a less would dry better. The green hops should be spread as evenly and as light as possible over the kiln. The fire at first should be moderate, but it may be increased as the hops dry and the steam is evaporated.

'Hops should not remain long in the bin or bag after they are picked, as they will very soon heat and become insipid. The hops should *not* be stirred on the kiln until they are completely and fully dried. Then they should be removed from the kiln into a dry room and laid in a heap, and there remain, unmoved and unstirred, until bagged, which is done with a screw, having a box made of plank, the size the bag is wished, into which the cloth is laid, and the hops screwed into the box, which is so constructed that the sides may be removed, and the bag sewed together while in the press.

'The hops, after laying a few days, will gather a partial moisture, called a sweat. The sweat will probably begin to subside in about eight days, at which time, and before the sweat is off, they ought to be bagged in clear dry weather. As the exact time when the hops will begin to sweat, and when the sweat will begin to subside or dry off, (the proper time to bag them,) will vary with the state of the atmosphere, it will be necessary to examine the hops from day to day, which is easily done by taking some of them from the centre of the heap with your hand. If on examination you find the hops to be very damp, and their color altering, which will be the case if they were not completely dried on the kiln, and not otherwise, you must overhaul them and dry them in the air.

'The most convenient size for a bag of hops to handle and transport, is about five feet in length, and to contain about two hundred and fifty pounds. The best bagging is coarse strong tow cloth of our domestic manufacturing; next to that, Russia hemp bagging. The East India sugar and gunny bags, so called, ought never to be used. The sugar bags are of an unreasonable weight, and both they and the gunny bags are of no value to the brewer; whereas the other bags are worth prime cost.

'It is now common for those who have entered considerably into the cultivation of hops, to build houses over their kilns, which, in wet weather, are very convenient; otherwise, a kiln in the open air would, in my opinion, be preferable. It is necessary to have these buildings well ventilated with doors and windows; and to have them kept open night and day, except in wet weather, and then shut those only which are necessary to keep out the rain. If a ventilator was put in the roof of the building, directly over the centre of the kiln, about six feet square, built like those in breweries and distilleries, I am of the opinion they would be found very advantageous. I have seen many lots of hops much injured both in color and flavor by being dried in close buildings.

'Where the houses over the kilns are built large, for the purpose of storing the hops as they are dried, which is a great saving of labor, a close partition should be made between the kilns and the room in which the hops are stored, to prevent the damp steam from the kilns coming to them, as it will color them, and injure their flavor and quality very much.

'I expect that many of our farmers will object to the mode of manuring hops which I have recommended, their common practice being to put the manure in the hills when they plant the hops, and afterwards to apply the manure on the hills at the first and second hoeings. I find the hop-roots are very liable to be injured by the worms, and to decay. My opinion is, that the manure in the hill has a tendency to produce the worms, and its fermentation at their roots to cause their decay; and that the crop is not more, if as abundant, as when manured in the manner I have recommended: and, farther, that a hop-yard manured in this manner will continue in a healthy state for many years.

'I also expect the quantity of manure I have recommended will be objected to by many, it being the common received opinion, that hops should have little or no manure. I find it a general complaint amongst the farmers where hops have been cultivated many years, that the quantity raised per acre does not exceed the one-half raised by their ancestors on the same land; inferring that the "hops are running out," as it is termed, and cannot now be cultivated to advantage. Hops, I believe, in common with all sorts of grain and vegetables, flourish best and produce the finest crops when cultivated on new lands, which require little or no manure; and such were the lands which their ancestors cultivated. The same complaint I presume would be made against all sorts of grain and vegetables, if raised with little or no manure, on lands that have long been cultivated.

'From my own observations, I am confident that no crop can be more improved and increased by high cultivation than hops.'

PEA. (*Pisum sativum.*) The pea is a hardy annual, a native of the south of Europe, cultivated in Great Britain from time immemorial, and in this country from its first settlement.

Times of Sowing. 'The dwarfs are generally employed in hotbed culture, which, however, succeeds badly, and is neither worth preserving nor describing, and the less so as early crops may be more certainly had by sowing in the fall, in sheltered situations, and covering during the winter with a layer of leaves, and another of long stable-litter, loosely applied, to keep the leaves in their places. After the earth takes a temperature favorable to vegetation, your pea sowings should be made once a fortnight, to keep up a regular and successive supply.'—*Armstrong.*

Quantity of Seed. 'Of the small, early kinds, one pint will sow a row of twenty yards; for the larger sorts, for main crops, the same measure will sow a row of thirty-three yards.'

Process in Sowing. 'For early sorts, make the drills one inch and a half deep; and let parallel drills be two feet and a half, three, or four feet asunder. Peas that are to grow without sticks require the least room. For summer crops and large sorts, make the drills two inches deep, and four, five, or six feet asunder. As to the distances along the drill, distribute the peas according to their size and the season: the frame, three in the space of an inch; the Charltons, Hotspur, and dwarf marrowfat, two in an inch; the Prussian blue and middle-sized sorts, three in two inches; the large marrowfat and Knight's, a full inch apart; the moratto, rouncivals, and most larger sorts, an inch and a half apart; and the Patagonian, two inches.'

Soil and Situation. 'The soil should be moderately rich, and the deeper and stronger for the lofty growers. Peas are not assisted, but hurt, by unreduced dung recently turned in. A fresh, sandy loam, or road-stuff, and a little decomposed vegetable matter, is the best manure. The soil for the early crops should be very dry, and rendered so, where the ground is moist, by mixing sand with the earth of the drills.' —*Loudon.*

Armstrong says, 'A loose and warm soil' is most favorable to this vegetable, which, by the way, is neither improved in quality nor quantity by stable manure. The soil of Clichy, and of Point de Jour des Colombe, &c., in the neighborhood of Paris, is a pure sand, principally devoted to pea crops, and yielding these most abundantly without the application of dung new or old.'

Subsequent Culture. 'As the plants rise from half an inch high to two or three inches, begin to draw earth to the stems, doing this when the ground is in a dry state, and earthing gradually higher as the stems ascend. At the same time, with the hoe, loosen the ground between the young plants, and cut down rising weeds. Early crops should be protected during hard frosts by dry straw or other light litter, laid upon sticks or brushwood; but remove the covering as soon as the weather turns mild. If, in April, May, and the course of the summer, dry weather occurs, watering will be necessary, especially to plants in blossom and swelling the fruit; and this trouble will be repaid in the produce. Rows partly cut off may be made up by transplanting. In dry weather, water, and in hot weather, shade, until the plants strike. All peas fruit better for sticking, and continue longer productive, especially the larger sorts. Stick the plants when from six to twelve inches high, as soon as they begin to vine. Provide branchy sticks of such a height as the sort will require; for the frame and Leadman's dwarf, three feet high; for the Charlton and middle-sized, four or five feet; for the marrowfat and larger kinds, six or eight feet; for the rouncival, and for Knight's marrow-pea, nine or ten feet. Place a row of sticks to each line of peas, on the most sunny side, east or south, that the attraction of the sun may incline the plants towards the sticks. Place about half the number on the opposite side, and let both rows stand rather wider at top than at the ground. Some gardeners stop the leading shoot of the most early crop when in blossom; a device which accelerates the setting and maturity of the fruit.

To forward an early Crop. 'Sow or plant in lines from east to west, and stick a row of spruce-fir [or other evergreen] branches along the north side of every row, and sloping so as to bend over the plants, at one foot or eighteen inches from the ground. As the plants advance in height, vary the position of the branches, so as they may always protect them from perpendicular cold or rain, and yet leave them open to the full influence of the spring sun. Some cover during nights and in severe weather with two boards, nailed together lengthwise, at right angles, which forms a very secure and easily-managed covering, but excludes light. A better plan would be to glaze one of the sides, to be kept to the south, and to manage such row-glasses, as they might be called, when over peas, beans, spinage, &c., as hand-glasses are managed when over cauliflower; that is, to take them off in fine weather, or raise them constantly or occasionally by brickbats, or other props, as the weather and the state of the crop might require.'—*Loudon.*

Management of a late Crop. The best variety for this purpose is Knight's marrow-pea, which may be sown at intervals of ten days from the beginning to the end of June.

'The ground is dug over in the usual way, and the spaces to be occupied by the future rows of peas are well soaked with water. The mould upon each side is then collected so as to form ridges seven or eight inches above the previous level of the ground, and these ridges are well watered. The seeds are now sown in single rows, along the tops of the ridges. The plants grow vigorously, owing to the depth of soil and abundant moisture. If dry weather at any time set in, water is applied profusely once a week. In this way, the plants continue green and vigorous, resisting mildew, and yielding fruit till subdued by frost.'—*Hort. Trans.* vol. ii.

To save Seed. 'Like other vegetables, the pea is susceptible of considerable improvement, and by the simple means of marking the finest plants of each variety, and keeping them for seed. Wilson's frame and the Knight pea have been formed in this way, and afford sufficient proof of the wonders produced by a very small degree of observation and care.'—*Armstrong.*

Field-culture of the Pea. The most common mode of sowing peas is broad-cast; but the advantages of the row culture, in a crop so early committed to the ground, must be obvious. Loudon says, 'In Kent, where immense quantities of peas are raised, both for gathering green and for selling ripe to the seedsmen, they are generally sown in rows from eighteen inches to three feet asunder, according to the kind, and well cultivated between. Peas laid a foot below the surface will vegetate; but the most approved depth is six inches in light soil, and four inches in clay soil; for which reason they ought to be sown under furrow when the ploughing is delayed till spring. Of all grain, beans excepted, they are in the least danger of being buried too deep.' —*Loudon.*

Deane observed, that 'for field peas, land that is newly ploughed out of sward is generally accounted best; and land which is high and dry, and has not been much dunged. A light, loamy soil is most suitable for them; and if it abound with slaty stones, it is the better. But they will do in any dry soil. The manures that suit peas best are marl and lime. Our farmers do not commonly allow a sufficient quantity of seed for peas, in broad-cast sowing. When peas are sowed thin, the plants will lie on the ground, and perhaps rot; when they are thick, the plants will hold each other up with their tendrils, forming a continued web, and will have more benefit of the air.'

Insects and Diseases. The *Massachusetts Agricultural Repository*, for June, 1822, contains some remarks of the Hon. T. Pickering, relative to a bug or fly, (*bruchus pisi*,) which preys on the pea, in which he observes, that an effectual remedy for this evil is *late sowing;* but the hot sun of June will so pinch the vines of the late sown peas, that the crop will be small, unless the land be moist as well as rich. He then details some experiments, by which he concludes that this insect is limited to a certain period for depositing its eggs; and if the tender pods are not found till that period has passed, the peas will be free from bugs. Colonel Worthington, of Rensellaer county, New York, 'sowed his peas on the 10th of June, six years in succession, and a bug has never been seen in his peas; whereas his neighbors, who have not adopted this practice, have scarcely a pea without a bug in it. He supposes the season for depositing the egg of the pea-bug is passed before the peas are in flower.'—*Memoirs of New York Board of Agriculture*, vol. ii. p. 23. 'The only insect that commonly injures our peas is a small brown bug or fly, the egg [or larva] of which is deposited in them when they are young, and the pods easily perforated. The insect does not come out of its nest till he is furnished with short wings. They diminish the peas in which they lodge nearly one-half, and their leavings are fit only for the food of swine. The bugs, however, will be all gone out if you keep them to the following autumn. But they who eat buggy peas the winter after they are raised, must run the venture of eating the insects.'—*Deane's New England Farmer.*

The same writer recommends, when seed peas are known or suspected to contain insects, to scald them a quarter of a minute in boiling water, spread them about, and sow them without delay. If any of the bugs should be in the peas, this scalding will destroy them; and the peas, instead of being hurt, will come up the sooner, and grow the faster.

Mildew is another evil attending peas, especially such as are sown late in the season. This disorder is supposed by Knight to be caused by 'a want of a sufficient supply of moisture from the soil, with *excess* of humidity in the air, particularly if the plants be exposed to a temperature below that to which they have been accustomed.' The remedy which he recommends is, to 'give water rather profusely once a week, or nine days, even if the weather proves showery.'—See *New England Farmer*, vol. i. p. 414.

Use. The use of peas for soups and other culinary purposes is well known. They are likewise very serviceable in fattening hogs, for which purpose they should be harvested dry, and ground into meal. If the straw be forward in autumn, and has been harvested without injury, it will be little inferior to ordinary hay for feeding cattle.

'In boiling split peas, some samples, without reference to variety, fall or moulder down freely into pulp, while others continue to maintain their form. The former are called *boilers.* This property of boiling depends on the soil: stiff land, or sandy land that has been limed or marled, uniformly produces peas that will not melt in boiling, no matter what the variety may be.'—*Loudon.*

'When peas are sown before winter, or early in spring, they are very apt to be eaten by mice. To prevent this, soak the peas for a day or two in train oil before you sow them, which will encourage their vegetation, and render them so obnoxious to the mice that they will not eat them.'—*Domestic Encyclopedia.*

BEANS. Loudon gives the following directions for the culture of *runners*, or *pole-beans*, as they are commonly called in this country:—The runner kidney beans may be sown in a small portion towards the end of April, [about the middle of May in New England.] if tolerably warm, dry weather; but as these beans are rather more tender than the dwarf sorts, more liable to rot in the ground by wet and cold, especially the scarlets, the beginning or middle of May [first of June in New England] will be time enough to sow a considerable crop; and you may sow a full crop about the beginning of June. Allot principally the scarlet and large white runners. Some Dutch runners are very eligible as a secondary crop. The first crops should have the assistance of a south wall. Intermediate crops may be sown in any open compartment, or against any fence not looking north. The latest sown will continue bearing longer under a good aspect and shelter. In sowing, draw drills about an inch and a half, or not more than two inches deep. Let parallel rows be at least four feet asunder, to admit in the intervals tall sticks or poles for the plants to climb on. Place the beans in the drills four inches apart, and earth them in evenly the depth of the drills. A row contiguous to a fence or building may ascend upon lines. Some may be sown in a single row along a border, or on each side of a walk, and have the support of a slight trellis of laths and lines; or they might be arched over with similar materials to form a shady walk or bower. In a cold, wet season, or when requisite to have a few plants more forward than the general crop, some scarlets may be sown in April, either in a slight hotbed, or in pots, under frames of hand-glasses, to raise and forward the plants, till two or three inches high: then, at the end of May, transplant them into the open garden. As the plants come up, and advance from three to six inches in growth, hoe some earth to the stems, cutting down all weeds. When they begin to send forth runners, place suitable supports to each row; and conduct the tendrils to the sticks or lines, turning them in a contrary direction to the sun. The ascending plants will soon come into flower, podding at the joints, in long succession. They are so prolific, that the returns from three sowings, in May, June and July, will last from July till October.

Taking the Crop. Gather the pods, both from dwarfs and runners, while they are young, fleshy, brittle, and tender, for then they are in the highest perfection for the table; and the plants will bear more fully, and last longer in fruit, under a course of clean gathering, not leaving any superabundant pods to grow old.

To save Seed. Either sow a portion for that object, or leave rows wholly ungathered of the main crop, or preserve a sufficiency of good pods promiscuously. The beans saved should be the first fruits of a crop sown at a period which throws the entire course of growth into the finest part of summer. Let them hang on the stalks till they ripen fully, in August and September; then let the haulm be pulled up and placed in the sun, to dry and harden the seed, which should be afterwards cleared out of the husks, bagged up, and housed.

The pea, English bean, and kidney bean, are liable to the attacks of various insects, especially the *aphides*, [plant lice,] in dry seasons. When early crops are newly sown or planted, mice will burrow for and eat the seed, and when it begins to penetrate the soil, it is attacked by snails, slugs, the cut-worm, &c. The usual means of guarding against the ravages of insects must, therefore, be resorted to by the gardener.

As regards the field culture of the bean, we would observe, that the white kind, which is most generally approved of in New England, will produce pretty good crops on poor, sandy, or gravelly soils; but, when planted on such ground, it is good husbandry to wet and roll them in plaster before planting. They may be planted in hills or drills, the rows two and a half or three feet apart, according to the strength of the soil, and cultivated like other hoed crops. They may be planted the latter end of May, or beginning of June, or about the time of planting Indian corn. If planted in hills, they may be placed from fourteen to twenty-four inches apart in the rows, and the rows the distance before mentioned. Five beans are quite enough to remain in a hill. Hogs' dung, mixed with ashes, is said to be the best manure for them; and it is said to be very injurious to beans to hoe them while the dew is on, or in wet weather.

Judge Buel, of Albany, has given the following notices of some experiments in the field culture of this vegetable: 'Beans may be cultivated in drills or in hills. They are a valuable crop; and, with good care, are as profitable as a wheat crop. They leave the soil in good tilth. The China bean, with a red eye, is to be preferred. They ripen early, and are very productive. I cultivated beans the last year in three different ways, viz. in hills, in drills, and sowed broad-cast. I need not describe the first, which is a well-known process. I had an acre in drills, which was the best crop I ever saw. My management was this: on an acre of light ground, where the clover had been frozen out the preceding winter, I spread eight loads of long manure, and immediately ploughed and harrowed the ground. Drills or furrows were then made with a light plough, at the distance of two and a half feet, and the beans thrown along the furrows, about the 25th of May, by the hand, at the rate of at least a bushel on the acre. I then gauged a double mould-board plough, which was passed once between the rows, and was followed by a light one-horse roller, which flattened the ridges. The crop was twice cleaned of weeds, by the hoe, but not earthed. The product was more than forty-eight bushels, by actual measurement. The beans brought me one dollar the bushel last fall. The third experiment was likewise upon a piece of ground where the clover had been killed. It was ploughed about the first of June, the seed sown like peas, upon the first furrow, and harrowed in. The drought kept them back; but about sixty-five rods of ground, on which the experiment was made, gave a product of twelve and a half bushels. The crop was too ripe when it was harvested, and as it was cut with a scythe, I estimated that about two and a half bushels were left upon the ground. No labor was bestowed upon them from the time they were sown till they were harvested.

SWINE. Notwithstanding their evil propensities, filthy and mischievous habits, and insatiable voracity, swine are very profitable animals to a farmer. Indeed, every family in which there is any cooking done should keep at least one hog, always confined in a proper pen, in order to consume the washing of pots, dishes, refuse food, &c.

As much depends on the breed of swine as of any domestic animal, as relates to the profit of keeping. The old-fashioned, thin, long-legged, long-nosed, gaunt-bodied hogs are now, we believe, hardly tolerated in New England, and are becoming as scarce as they are ugly and unprofitable. We are but little acquainted with the different breeds of their successors, and shall not therefore assume the responsibility of recommending any particular race. O. Fiske, Esq., of Worcester, an able, enlightened, and patriotic cultivator, says, 'My hogs are of the Bedford breed, so called in England; and experience has proved to my satisfaction that this breed is far the best that has been introduced into our country. They are quiet in their nature, fat easy, and with little expense or trouble. I have had some weigh at twelve months old about three hundred and forty pounds, and a considerable number of eighteen months old four hundred pounds.'

'The marks of a good hog are a moderate length in proportion to the size of the body; the nose short; the cheek plump and full; neck thick and short; quarters full; carcass thick and full; hair fine and thin; with a symmetry adapted to the breed to which it belongs. Above all it is essential that it be of a kindly disposition to fatten early.'

The sow should be selected with great care, broad and straight-backed; wide hips; a great many teats; short legs, and fine bone. It is said that the sow will produce the stronger and better litter if not allowed to breed till a year old, and the boar should not be younger than that age when put to sows. Sows may be allowed to breed till they are six years old, and boars till five; and both be made good pork after this period, by methods which do not require description. One male, according to the *Complete Grazier*, should not be permitted to have access to more than ten females in a year. Sows will usually have pigs twice a year, and should be put to the males at such times as will bring one litter in April and another early in September.

'Those sows are accounted the best breeders,' says the Farmer's Assistant, 'which have about ten or twelve paps. They should be kept clean and well littered; but should not have too much litter at the time of pigging, lest they overlay their pigs in it. At the end of a week or ten days, they should be let out of their sties into the yard for three or four hours each day. Where several sows are farrowing about the same time, they must be kept in separate apartments in the sty, lest they devour the pigs of each other. Young sows will sometimes eat their own offspring, which may be prevented by washing the backs of the pigs in an infusion of aloes; and, for this purpose, the sows must be watched. It is said that supplying them with plenty of water at this time will prevent any mischief taking place of this kind.'

Mr. Featherstonhaugh says, 'Farmers differ much in their plans of raising holding stock for pork; some permitting their shoats to run at large eighteen months, till they are penned up to fatten; this is the most troublesome and least profitable way; others give them a range in clover pastures, and begin to fatten them earlier. I apprehend there is a much more profitable way, and attended with less trouble for those who have the right breed. According to the quantity of pork wanted should be the number of breeding sows kept over, and there should be no other hogs on the farm [that is, kept over winter] but the breeding sows. These, when they pig the latter end of March, should be fed in the most attentive manner, with swill and shorts. The pigs from a full-grown sow will generally be twelve in number; these should be thinned down to eight, and as soon as they begin to feed freely out of the trough should be weaned, and afterwards fed regularly with green tares, clover, boiled potatoes, ground peas, unmerchantable corn, or any other nourishing food; turning them out every day into a small yard, where there is a shallow pond for them to lie in. A remarkable breed of pigs, which had been treated pretty much in this manner, were exhibited at Duanesburgh fair; when eight months old, one of them was slaughtered, and weighed exactly three hundred and eleven pounds; they all attracted universal attention, and I never saw such animals before. This method, as it is attended with little trouble, and leaves so small a quantity of stock on hand to winter over, appears to me to be more economical, in every point of view, than any other which is practised.'* In the county of Rensellaer, New York, some farmers assert that 'March pigs, killed about Christmas, are the most profitable for pork.' Others say, 'pigs ought never to come until June; for the cost of earlier pigs exceeds the profit.' And, farther, we learn that 'the methods proposed for fattening hogs by the different farmers in that county are very various. General H. Moffit, H. Platt, Esq., colonel Worthington, Messrs. J. Phillips, A. Bush, and some others, recommend keeping hogs in pastures, with some slops from the dairy, &c., till near the last of August; some say a little later. All agree that near this time they manifest a disrelish for grass. Small patches of peas, or even of corn, will then be convenient to turn them into for a few weeks. About the first of September begin with boiled potatoes and pumpkins, mashed together, with a little Indian meal, ground oats and peas, or other grain, stirred into the mixture after it cools. From two to four weeks before killing time, the food should be dry Indian corn, and clean cold water. Mr. Yonghans fattens his hogs in a large yard or field, with a shelter in it to which they may retire to sleep. But elder Turner says, hogs should never know what liberty is, but should be kept close all their lives, and as inactive as possible; that with this method double the quantity of pork can be produced with the same expense of feed.'†

The practice in Scotland is to rear swine chiefly on raw potatoes, and to fatten them on these roots boiled or prepared by steam, with a mixture of oats, barley, or bean and pea-meal. Their troughs should be often replenished with a small quantity of food at a time, and kept always clean, and seasoned occasionally with salt.‡ The Farmer's Magazine says, 'The outside leaves of cabbages, salted and let stand a month, and then mixed with buttermilk, will fat a hog in three weeks.' Mr. Marshall says, (Midland Counties, v. p. 453,) 'Young pigs require *warm* meat to make them *grow.* Corn and cold water will make them healthy; but warm beverage is considered as requisite to a quick growth.'

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* Memoirs of the New York Board of Agriculture, vol. i. p. 332.
† Memoirs of the New York Board of Agriculture, vol. ii. pp. 39, 40.
‡ Report of Agriculture in Scotland.

The same writer mentions another practice, which perhaps it may be thought proper to imitate in this country, because it saves labor and care. Some English farmers, he says, 'keep two or three little store pigs in the fatting sty. While the fatting hogs are taking their repast, the little ones wait behind them, and as soon as their betters are served, lick out the troughs.

'Besides the advantage of having by this expedient no waste nor foul troughs, there is another. The large pigs rise alertly to their food, lest the small ones should forestall them; and fill themselves the fuller, knowing that they have it not again to go to.

'The disadvantage of this practice is, I understand, the large ones are apt to lord it too much over the little ones; especially in a confined sty. If, however, they had a separate apartment assigned them, with an entrance too small for the fatting swine to follow them, this disadvantage would be in a great measure remedied.'

If one wishes to fatten hogs, and either from indolence or too much occupation does not expect to give them a constant and regular attention, perhaps he may adopt to advantage the following mode, pointed out by an English writer. 'Mr. John Adams, of Cherrington, near Newport, Shropshire, has fattened eight pigs in the following cheap and easy manner: he places two troughs in the sty, one he fills with raw potatoes, the other with peas, and gives no water; when the pigs are dry they eat the potatoes. The eight pigs were fattened so as to weigh from sixteen to twenty score each, and ate no more than thirty bushels of peas, and about two hundred bushels of potatoes.' No doubt dry Indian corn and potatoes might be fed out in this way with as good an effect as peas and potatoes.

Rubbing and currying the hides of fattening hogs is of great advantage to them. It is not only very grateful to them, but conducive to their health. It will be well, likewise, in every sty to place a strong post for the animals to rub against. During the time of their fattening they should have plenty of litter, which will be a double advantage, providing for the comfort of the animal and increasing the quantity of manure.

Boiled or steamed clover hay will, it is said, keep store hogs in the winter, but the addition of boiled or steamed potatoes or carrots will much increase the value of the wash. Mr. Young directs to soil or feed swine in a yard on clover, cut up with a scythe, in preference to pasturing them in the field. But judge Peters, of Pennsylvania, says, 'In summer my hogs chiefly run on clover. Swine feeding on clover in the fields will thrive wonderfully; when those (confined or not) fed on cut clover will fall away.' In Indian harvest, the unripe ears of corn should be picked out and given to the hogs as fast as they can eat them. Soft corn (as it is called) will do them much more good in a green than in a dried state, and it is very difficult to dry it without its turning mouldy.

There is a great advantage in boiling, steaming, or baking almost all sorts of food given to swine. The last American edition of the Domestic Encyclopedia informs, that 'Mr. Timothy Kirk, of Yorktown, Pennsylvania, fed one pig with boiled potatoes and Indian corn, and another with the same articles unboiled. The two animals were weighed every week, and the difference between them was as six to nine. The experiment was continued several weeks, and the animals alternately fed upon boiled and unboiled food, with a uniformity of result, which sufficiently showed the very great profit arising from boiled food.' Steaming will answer as good a purpose as boiling, and with a proper apparatus may be more easily and cheaply effected.* Potatoes, meal, and a little linseed boiled together, make a rich and excellent wash. Boiled linseed, it is said, has a tendency to make pork soft and oily, and should therefore be but little if at all used towards the close of the time in which hogs are fattening. Grains of distilleries and the refuse of starch factories are excellent for fattening swine. Sweet apples are very good food for them, and a change of diet pretty often promotes their health and quickens the process of fattening. Their meals should frequently be seasoned with a little salt. The Complete Farmer says that 'moist sedgy grounds are good for swine, the roots which grow in such soils they will eat; likewise brakes, ground-nuts, acorns, chestnuts,' &c. Dr. Anderson said that the hogs that are fed upon the acorns that they gather in the woods of Germany and Poland are reckoned to yield the finest bacon of any in Europe; and it is to this that most people ascribe the superior excellence of Westphalia hams. It might be well to try acorns steamed or boiled, in order to correct their crudeness and bitterness; and it has been recommended to moisten them, and keep

* See New England Farmer, vol. i. p. 23.

them on hand till they begin to sprout, when they will be more sweet and nutritious than in their original state. The Complete Farmer asserts that 'when hogs are fatted *entirely* on acorns, chestnuts, and other productions of the forest, the flesh will eat much better and sweeter than if fattened in a sty. Some indeed say their fat will not be so solid, nor so profitable, and therefore they commonly shut them up a week or ten days, and feed them with dry peas; but this is a mistake, *experience having shown that hogs fatted with acorns only have their fat as solid as those fatted with peas.*' If this be correct, the value of acorns as food for swine is not generally known in those parts of the United States with which we have been acquainted. We have seen places in the neighborhood of farmers' dwellings where bushels might be had for stooping, but were as much neglected as if they had been pebble stones. The acorns recommended are, we believe, those of the white oak; and whether the acorns of the numerous other kinds of oak are of any value as food for swine we cannot say. It might be well to try them, not only raw, but boiled or steamed, and likewise ground into meal, and given with, as well as without other mixtures. We suspect that acorns alone would prove astringent, and if so, they might be qualified with a trough full of raw potatoes.

Carrots, according to Mr. Young, are better than potatoes, and some other writers assure us that parsnips are better than either for feeding hogs. An English writer says, 'They fatten all their pork in the island of Jersey with parsnips. They are much more saccharine than carrots, and it is well known that nothing fattens a hog faster or makes finer pork than the sugar-cane:' and we are told that parsnips suffered to remain in the ground where they grew through the winter, and drawn in the spring and boiled tops and bottoms, made most excellent food for swine when other food was scarce.

Acid or fermented food for swine has been highly recommended. Mr. Arthur Young, whose authority amongst husbandmen is almost equal to that of the pope with Roman Catholics, says, 'that the most profitable method of converting corn of any kind into food for hogs is to grind it into meal, and mix this with water in cisterns, in the proportion of five bushels of meal to one hundred gallons water; stirring it well several times a day for three weeks in cold weather, or a fortnight in a warmer season, by which it will have fermented well and become acid, till which it is not ready to give. The mixture should always be stirred immediately before feeding, and two or three cisterns should be kept fermenting in succession, that no necessity may occur of giving it not duly prepared.' Judge Peters, of Pennsylvania, whose authority is, in our opinion, not inferior to that of any man who ever wrote on agricultural topics, says, in substance, that 'sour food is most grateful and alimentary to swine. One gallon of sour wash goes farther than two of sweet.' But

An English work entitled 'Farmer's Calendar,' (author's name not given,) declares that 'much has been said, and little understood, about *purposely* souring food for hogs. It is not that acidity can possibly tend to pinguefaction, [making fat,] but it is found the pigs will readily fatten upon acid, or rather acescent food, a sweetish taste and glutinous quality succeeding fermentation; *and that they will do so still more readily upon such as has never reached the acid state, I know and have seen in hundreds of instances.* Is a proof wanted? How much more readily do the country hogs feed upon sweet and unfermented food, than those of the starch-house upon the fermented and subacid wash, however rich. I say subacid, for did not starch-makers run off a great part of that which is really *sour*, they would kill instead of fatten their hogs.' In order to reconcile these writers it will only be necessary to advert to the different stages of ordinary fermentation, and the products of each stage. The first stage of fermentation produces sugar, and is called the saccharine fermentation. The second stage develops alcohol, or spirit of wine, and is called the vinous fermentation. The third stage produces vinegar, and is called the acid fermentation; and the fourth and last stage converts the matter fermenting into a substance which is not only offensive, but poisonous, and is called the putrid fermentation. Thus if you soak wheat or other farinaceous substance in water of a proper temperature it will first become sweet, and begin to sprout or vegetate; it will next afford spirit or alcohol; continue the process, the wash turns sour, at first slightly, and then more strongly acid; and at last the whole becomes putrid. It probably contains most nourishment when it is sweetest, but it is valuable till very sour, when it is worth little or nothing; and when the putrid fermentation has commenced it is worse than nothing, as food for any animal. The farmer then should give his wash to his pigs while it is yet sweet, or but beginning to turn sour.

Fattening Pigs on Coal. Cunningham, in his '*Two Years in New South Wales,*' relates, 'I had often heard it said among sailors that pigs would fatten on coals, and although I had observed them very fond of munching up the coals and cinders that came in their way, still I conceived they might relish them more as a condiment or medicine than as food, till I was assured by a worthy friend of mine, long in command of a ship, that he once knew of a pig being lost for several weeks in a vessel he commanded, and it was at last found to have tumbled into the coal-hole, and there lived all that period without a single morsel of any thing to feed upon but coals: on being dragged out, it was found as plump and fat as if it had been feasting on the most nutritious food. Another friend told me of a similar case, which came under his observation; and although these may be solitary instances, yet they serve at least to show the wonderful facility which the stomachs of certain animals possess of adapting their digestive powers to such an extraordinary species of food, and extracting wholesome nourishment therefrom. When we consider coal, however, to be a vegetable production, containing the constituent principles of fat, carbon, hydrogen, and oxygen, our surprise will decrease.'

An Ohio farmer also, in a southern paper, recommends coals as useful in fattening hogs. After giving his hogs a small quantity daily, say two pieces to each, about the size of a hen's egg, they discontinued rooting, were more quiet, and appeared to fatten faster. He omitted the coal a few days, and they commenced rooting; he gave it again, and they ceased to root. He supposed that the coal corrects the morbid fluid in the stomach, which incites them to root deep in search of fresh earth.

The following mixture for fattening swine has been recommended:

Wash potatoes clean, boil and mash while hot, mix in at the same time oats and pea meal. Put the mixture into a large tub, which must stand till it becomes sour, but not putrid. Keep a quantity of this on hand, always fermenting, and give it to your hogs as often as they will eat.

Apples have been much recommended as food for swine. They are good raw, but better if boiled and mixed with meal. A writer for the Brattleborough Reporter observes, 'I have tested by ten years' experience the value of apples as food for animals. I keep five or six hogs in my orchard, upon nothing but apples and a little swill; and have uniformly found them to grow and gain flesh faster than hogs fed upon any thing else but grain. On the first of November, they are very decent pork; after which I feed them about six weeks on grain before I kill them; and I believe I have as fat hogs and as good pork as my neighbors, who give to their hogs double the quantity of grain that I do to mine.'

Sows devouring their Offspring. It is not unfrequently the case that sows destroy their offspring. In the New England Farmer, vol. v. p. 214, is a communication from the Hon. O. Fiske, in which he observes, 'In most cases where I have inquired into the fact, whether in old or young breeders, I have ascertained that they have been disturbed in some of their essential habits, either having been removed from their companions, their range restricted, or from being removed from one pen to another. All these changes, however, may be effected with safety, by allowing them sufficient time to become accustomed to them, four or five weeks at least. I have known sows do well with a second litter after having destroyed a first under one of the above excitements. Hence it would be unwise to condemn to death one which bid fair otherwise to be a valuable breeder, even for this most unnatural crime.

Another writer, with the signature 'D.' directs to 'separate the sow from the rest of the swine six or eight weeks before her bringing forth, so that she may become accustomed to her pen. Care should be taken, however, to have her pen kept dry and well littered; always give them litter enough so as not to be obliged to give any for six days before the time, for nothing disturbs a sow more than an abundance of litter, and which in my opinion has a great tendency to induce her to destroy her young. If the sow is with the other swine till within a few days of her bringing forth, and then separated, she will not get accustomed to her pen, and being disturbed, she will be pretty sure to destroy her pigs.

'Raw salt pork, cut in small pieces, and given, will prevent them from eating their pigs. I have seen it given after they had ate two or three of their litter, with good success. But to prevent any mischief it should be kept by them at this time.* A writer for the same paper, vol. xi. p. 298, observes, 'I have been careful for about a week before my sows were about to farrow, to give them some butcher's re-

* N. E. Farmer, vol. xi. p. 297.

fuse meat, which does not cost much; if easy to be procured give them a plenty, and I will venture to say that they will not eat their pigs.'

Another, in the same volume, p. 305, observes, 'When the period of yeaning is near I take the sow apart and give her free access to a *warm bed-room* of ample dimensions in my barn, with *a dry plank floor*, where the shingled walls prevent the entrance of cold, rain, or wind, with just enough straw to amuse her "moments of anxiety," but not enough to allow a single pig to cover his head and lose his road to the fountain of comfort.' A writer with the signature 'Berkshire,' in the same volume, p. 321, states as his opinion that the evil is caused by confining the sow in a light pen from the ground, and the want of a suitable supply of potatoes, turnips, ruta baga, &c., in addition to their other food. '*Whaler*,' in the same paper, p. 338, who has raised fine pigs on board of a whale ship, at sea, without grass or roots, believed animal food the specific remedy for the unnatural inclination of sows to devour their offspring. And 'A Subscriber' 'is sanguine in the opinion that if sows are so placed as to be able to come to the ground a few days before pigging, no disappointment would ever happen in the loss of pigs. It is not convenient to let them ramble at large; a temporary pen upon ground is equally good.'

Swine should not be kept in close and filthy pens. Though they wallow in mire, their object is coolness, not nastiness, and they thrive faster and enjoy better health when allowed clean and dry lodgings than when they are not thus accommodated. The late judge Peters, of Pennsylvania, in an article entitled '*Notices for a Young Farmer*,' &c., observed, that 'there is no greater mistake than that of *gorging* swine, when first penned for fattening. They should, on the contrary, be moderately and frequently fed, so that they be kept full, but do not loathe or reject their food, and in the end contract fevers and dangerous maladies, originating in a hot and corrupted mass of blood. In airy and roomy, yet moderately warm pens, paved and boarded, and often cleaned, they are healthy and thriving. They show a disposition to be cleanly, however otherwise it is supposed, and always leave their excrementitious matter in a part of the pen distinct from that in which they lie down. No animal will thrive unless it be kept clean.'

The same writer asserted in substance, that fatting hogs should always be supplied with dry rotten wood, which should be kept in their pens, for the animals to eat as their appetites or instincts may direct. It has been supposed, likewise, that swine thrive the better when they can obtain fresh earth, which they are often observed to swallow with greediness. Charcoal, it is said by some, will answer as good, if not a more valuable purpose; and that if swine can obtain charcoal, they will not only greedily devour a portion of that substance, but will be but little inclined to rooting, and remain quiet in their pens.

It is an object of much consequence to obtain the best breed of swine, not only as regards the saving of food, but producing the best qualities of flesh. The Hon. Oliver Fiske, of Worcester, as before observed, has rendered great service to the community by introducing to the notice of farmers in this country a variety of this animal called the Bedford Breed. This breed has been highly recommended by many who have ascertained their merits by trial. His excellency Levi Lincoln, late governor of Massachusetts, and president of the Worcester Agricultural society, has given his opinion of this variety, in a letter, from which the following are extracts:

'I have great pleasure in voluntarily offering myself as your compurgator in the representations with which you have recently favored the public, of the Bedford breed of swine. The care and perseverance which have marked your attention to the prospects and value of these animals, and the success which has followed your exertions to introduce them to the favor of *practical* farmers, require, at least, an acknowledgment of obligation from all those who have been particularly benefited by your liberality, and from no one more than from myself. This breed of swine has taken the place of a long-legged, long-nosed, flat-sided, thriftless race, called by some the *Irish* breed, by others the Russian, which would barely pay by their weight for ordinary keeping, and never for one-half the expense of fattening, if, indeed, grain would make them fat.'

'I had three pigs butchered from the same litter, precisely seven and a half months old. Their weights, when dressed, were two hundred and thirty, two hundred thirty-five, and two hundred and thirty-eight and a half pounds. One sold in Boston for six and one-fourth cents per pound; the others were put up here for family use. The expense of keeping and fattening these pigs, I am satisfied, was less than with any other breed I ever raised, and the proportion of bone and offal to the valuable parts was surprisingly small. I have fifteen more on my farm, part designed for the market in the spring, and part to be kept over as store swine, and their appearance will furnish ocular satisfaction of the propriety of all which has been said in favor of the breed.'

The above is followed by a communication from the Hon. O. Fiske, in which he says: 'I have obtained the following account of the introduction of this breed of swine from the Hon. T. Pickering. He saw them first on a farm of general Ridgely, about fourteen miles from Philadelphia. General Ridgely informed him that they were brought to this country as a present to general Washington, from the duke of Bedford, who committed them to the care of an English farmer by the name of Parkinson. This man took a farm in the neighborhood of Baltimore; but instead of sending the swine to general Washington, Parkinson sold them. General Ridgely esteemed them very highly, and sent colonel Pickering a pair of them, in a vessel bound to Salem.

Mr. John Reed, of Roxbury, obtained the breed from colonel Pickering's stock; from Mr. Reed I obtained the offspring from separate litters, and transferred them to Worcester, where, by avoiding the breeding directly *in and in*, I have preserved them without degenerating. The race is most perfect and valuable when unadulterated, but affords a most valuable improvement to our native breed when judiciously crossed.'

Captain John Mackay, of Boston, has exhibited at Brighton a peculiar and excellent breed of swine, which have repeatedly received premiums from the Massachusetts Agricultural society.

MANURES. No soil will always prove productive without manure. Though naturally fertile, if some equivalent for its produce is not returned to it; if it is always yielding and never receiving, it must, at length, become barren.

Particular spots, like Egypt, and other alluvial or interval lands, which are annually overflowed, derive manure from the bountiful hand of nature, and cannot be rendered barren by bad husbandry or continual cropping. Some soils, likewise, are not easily exhausted, and are easily recruited, in consequence of being composed of materials which attract and retain the food of plants from air and water, as well as afford a proper medium to prepare and communicate the principle of fertility.

Every species of matter capable of promoting the growth of vegetables may be considered as manure. Vegetables are composed of certain substances called by chemists oxygen, [formerly called vital air] hydrogen, [inflammable air] carbon, [coaly matter] and nitrogen, or azote, one of the constituent parts of the atmosphere. The substances employed as manure should be composed of all or some of these elements.

Vegetable and animal substances, deposited in the soil, are consumed during the process of vegetation; being mostly absorbed by the roots of plants, combined with water. These substances compose what is called the food of plants. This food is mostly taken in by the roots, which are analogous to the mouths of animals, but some portion of the nourishment of vegetables is also derived from the atmosphere, imbibed by the leaves and bark. Thus the carcasses of lambs and other small animals are sometimes hung on the limbs of fruit-trees to promote their growth, and cause them to bear abundantly, and thus produce some effect; but the practice is slovenly and wasteful, as the air is contaminated, and the carcass buried near the roots would be much more efficient as manure.

A controversy has existed relative to the degree of fermentation which manure should undergo before it is applied to the soil. Some agriculturists contend that long, fresh, or unfermented manure is to be preferred. Others assert that stable and barn-yard manure never should be spread in the field till the fibrous texture of the vegetable matter is entirely broken down, and it becomes perfectly cold, and so soft as to be easily cut with a spade.

Sir Humphrey Davy observes, 'If the pure dung of cattle is to be used as manure, there seems no reason why it should be made to ferment, except in the soil; or if suffered to ferment it should be only in a very slight degree. The grass in the neighborhood of recently voided dung is always coarse and dark green; some persons have attributed this to a noxious quality in unfermented dung; but it seems to be rather the result of an excess of food furnished to the plants.

'During the violent fermentation which is necessary for reducing farm-yard manure to the state of what is called *short muck*, not only a large quantity of fluid, but likewise of gaseous matter, is lost; so much so that the dung is reduced one-half or two-thirds in weight; and the principal elastic matter disengaged, in carbonic acid, and some ammonia; and both of these, if retained by the moisture of the soil, are capable of becoming useful nourishment of plants.

'It is usual to carry straw that can be employed for no other purpose to the dunghill to ferment and decompose; but it is worth an experiment, whether it may not be more economically applied when chopped small by a proper machine, and kept dry till it is ploughed in for the use of the crop. In this case, though it would decompose much more slowly and produce less effect at first, yet its influence would be more lasting.'

Robert Smith, Esq., president of the Maryland Agricultural society, in an address to that society, observed, 'With respect to stable dung, I shall for the present content myself by barely suggesting, that my experience strongly inclines me to the opinion that, however long, it ought to be ploughed into the ground without any previous stirring, and as soon as practicable after it has been taken from the farm-yard.'

We believe that the question relative to long and to short manure must depend on circumstances. In certain soils, and for certain crops, long manure which has undergone but a slight fermentation is to be preferred. But if used for wheat, and other kinds of grain, and in all crops which cannot conveniently be hoed or weeded, or, probably, when applied to soils containing acids or some substances which may prevent fermentation and retard the progress of putrescence and dissolution, it must be well rotted.

Rotting manure, however, in a barn-yard, or in any situation in which its volatile and liquid products escape into the atmosphere, or soak into soil not designed to support vegetation, is very slovenly and wasteful, and always to be avoided if possible. The effluvia or gas which is suffered to escape from fermenting manure is not only almost altogether lost to useful vegetation, but, what is still worse, fills the atmosphere with particles injurious to health, and often destructive to life. The evaporations from a manure yard rob the farmer of a part of his substance, starve his crops, and it is well if they do not, moreover, poison him and his family by their contaminating influence. Some farmers' barn-yards, hogpens, and other receptacles of manure, are very offensive, and if they do not generate typhus fever in its worst form, which we fear is frequently the case, they at least cause a degree of languor and debility, which embitters existence, and in a great measure disqualifies for any useful purposes of life. It is a fact that those exhalations so injurious to animal life are the essence of vegetable life, and the volatile substances which offend our senses and injure our health, if arrested in their transit by the hand of skilful industry, may be so modified in the great laboratory of nature as to greet us in the fragrance of a flower, regale us in the plum or nectarine, or furnish the stamina of life in substantial viands from the field and the stall of the cultivator.

If we are correct in the foregoing an important axiom may be adduced, viz.: *No putrefactive process ought to be suffered to proceed on a farmer's premises, without his adopting some mode to save, as far as possible, the gaseous products of such putrescence.* These gaseous products constitute important elements of vegetable food, and a farmer may as well suffer his cattle to stray from his stall, or his swine from his sty, without a possibility of reclaiming them, as permit the principles of fertility expelled by fermentation or putrefaction to escape into the atmosphere for the purpose of poisoning the air, instead of feeding the plants. It is very easy to arrest these particles. A quantity of earth thrown over the matter in which the fermentation is going on will check its violence and arrest its gaseous products, which will be imbibed by the soil, and afterwards yielded to plants in such proportion as the wants of vegetation may require.

'Fermentation, that destroyer of all organic conformation, is not to be feared by the farmer, if it be conducted and carried on in the presence of earth, which fixes and secures the gases as fast as they are liberated. Even the degree of the process is a matter of less consequence; because if the elementary principles are in keeping, and reserved for future usefulness, it is immaterial whether this has happened by a new absorption, or by still holding their original and unchanged form. In his composite hill, [compost heap] the whole animal or vegetable structure may be dissolved, and leave behind no trace of existence, without the least waste of the principles of fertility; because the ingredients superadded to the dung have become surcharged with them, or, to speak philosophically, fully saturated. We may go farther and state that complete decomposition is desirable in this case, which is so much to be avoided in the farm-yard; because putrescent matter can only become vegetable food by its resolution into primary parts, and if this be effected by any preparatory step, the young crop receives the full and instantaneous benefit. The compost manure is carried to the field ready to give out its richness on the very first call, and to supply the nascent radicle [young root] with a copious share of nourishment.

'The putrefactive process may be carried on in the presence of pure earth only, or of earth intermingled with fibrous roots, or lastly in the presence of peat, which is an assemblage of inert vegetable matter, and compost dunghills may be formed according to this threefold method.

'The simplest of all composts is a mixture of barn-yard dung and surface mould taken from a field under regular culture. The proportions between the ingredients are fixed by no determinate laws, and consequently great liberty is allowable to the operator. I have known some instances where two cart-loads of dung were used for one of earth; others where they were blended in equal quantities; and it is not unfrequent to compound two of earth with one of dung. In fact such is the uncertainty in the composition, that almost every farmer adopts one peculiar to himself, and with equal success. No man need therefore follow implicitly the rules which have been laid down in this department of rural economy, but may vary and multiply his experiments, according to the suggestions of fancy or the dictates of convenience. If we slightly glance at the principle, we shall see the cause of this seemingly endless variety in the combinations of the ingredients. The only use of intermixing the soil with the dung is to imbibe the gaseous elements of vegetable life, and hinder their dissipation. If there be much soil, these elements will be diffused through it with less density and compression; if little, it will be more abundantly saturated and enriched with the nutritive vapors. The only error into which the farmer can run is to supply such an inconsiderable quantity of soil as will be incapable of imbibing the elastic and volatile particles, and thus by his own mismanagement occasion a waste of the vegetable aliment. One cart-load of soil to two of stable dung is the least proportion which he should ever attempt to combine, and perhaps if the two were mixed equally, he would be compensated for the additional labor and expense.

'Simple earth, although excellent for bottoming and strewing over the pit dug near the barn, is of all materials the most unprofitable in compost dunghills. A matted sward, thickly entangled with roots, or mud dragged from the bottom of bogs or ditches, and replete with aquatic plants, are clearly preferable on this account, that, besides bringing earth to the composition, they supply a large proportion of vegetable matter. Whenever the soil must be carted to the heap it is better to lay out the expense in transporting these enriching materials; because they will not only equally absorb and retain the evaporating gases, but greatly augment the quantity of manure.'*

The path proper for a farmer to pursue in order to make the most of his manure, and preserve his own health and that of his family, is as plain as a turnpike. Whenever putrid fermentation is going on in any part of his premises, and consuming his substance by a slow but wasteful combustion, let him apply earth, peat, or some other earthy substance in quantities sufficient to attract, imbibe, and retain all the effluvia. Health, profit, and cleanliness equally require such a proceeding. We shall say a word or two on the latter topic. If a man were to swallow daily a quantity of filthy matter, or to eat his food impregnated with vapors from a manure heap, or from some other putrefying and offensive substance, when he might by a little exertion avoid such nauseous viands, and substitute something nourishing, palatable, pure, and wholesome, we should esteem him no better than a Hottentot. But a man may almost as well take filth into his stomach, as filthy effluvia into his lungs; he may about as well dine with a crow or a buzzard as sup with a toad 'on the vapor of a dunghill.'

The farmer who arrests the rank vapors which emanate from decaying animal and vegetable matter, and instead of permitting them to pass into and contaminate the air he breathes, treasures up the invisible particles with which they are laden, and applies them to feed useful vegetables, causes the atmosphere to be healthy, and his plants to be thrifty by the same means.

The celebrated lord Erskine, in a speech delivered at one of the annual sheep shearings at Holkham, in England, made the following remarks on this subject:

'If we consider the subject of manure, we shall perceive one of the most striking beauties and benefits of divine ordination, and of that wisdom with which we are blessed a

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Letters of Agricola, by John Young, Esq.

thousand ways without knowing it. This very substance, had it been useless, must have accumulated in heaps, intolerably noisome and perpetually pestilential; but by the blessing of Providence, it is every man's interest to remove these otherwise increasing mountains of filth, and by decomposition, in various ways, in a great measure concealed from us, it gives increase to our fields, and adds to our means of industry, and the reward of the husbandman.'

Those who cultivate the ground do not always act the provident part supposed by lord Erskine, in the sentence above quoted. On the contrary, farmers too often suffer manure to accumulate and waste in heaps, generating effluvia 'intolerably noisome and perpetually pestilential,' without fear of fever or famine, both of which are courted by such conduct. Not only dung is too often allowed to waste its richness on the tainted air, but straw and other litter is suffered to grow mouldy and consume by what is sometimes called the dry rot, both of which might be prevented, or their bad effects obviated, by covering or mixing them with a suitable quantity of earth. Besides, dead animals, contents of privies, the emptyings of sinks, spoiled provisions, the refuse of the dairy, the pantry, and the cellar, are allowed to mingle their odours in nauseating and deleterious profusion. Sometimes the highway is rendered almost impassable in consequence of a dead horse, sheep, dog, or cat undergoing the process of decomposition in a situation correctly calculated to annoy travellers. Some farmers hang dead lambs, cats, dogs, &c., in the forks of apple-trees, or throw them on hovels or stumps, at some elevation from the ground, to give the pestilential emanations a chance to diffuse themselves, without coming in contact with the earth, which might convert them from poison to men and animals into food for plants. If, however, such animal remains are deposited in a barn-yard or manure heap, they are too often suffered to lie and rot on the surface, offending the senses, and injuring the health of a whole village. Practices of this kind are well reproved by Sir Humphrey Davy, who says, 'Horses, dogs, sheep, deer, and other quadrupeds that have died accidentally or of diseases, after their skins are separated, are often suffered to remain, exposed to the air, or immersed in water, till they are destroyed by birds or beasts of prey, or entirely decomposed; and in this case most of their organizable matter is lost from the land on which they lie, and a considerable portion of it employed in giving out noxious gases to the atmosphere.

'By covering dead animals with five or six times their bulk of soil, mixed with one part of lime, and suffering them to remain for a few months, their decomposition would impregnate the soil with soluble matters, so as to render it an excellent manure; and by mixing a little fresh quicklime with it, at the time of its removal, the disagreeable effluvia will be in a great measure destroyed, and it might be employed in the same way as any other manure to crops.'*

If, however, quicklime cannot readily be obtained to accelerate the conversion of dead animals into manure, it is probable that covering the carcasses with a pretty thick coat of unleached ashes, and placing over all a quantity of earth or earthy substance, would hasten decomposition, and secure the gases resulting from putrescence. Earth alone will answer a valuable purpose, and *in time* the largest animal will be decomposed in nothing but common soil.

Not only the carcasses of animals, but their excrements and urine are rendered of little value by long exposure to the air. Indeed, every moment of such exposure robs them of a part of their fertility, as well as contaminates the atmosphere. 'He who is within the sphere of the scent of a dunghill (says the celebrated Arthur Young) smells that which his crop would have eaten, if he would have permitted it. Instead of manuring the land he manures the atmosphere; and before his dunghill is finished, he has manured another parish, perhaps another county.' As few exhalations as possible ought to be suffered to rise from the excrements of animals. Fresh manure ought to be kept as carefully from the sun and rain as grass which has been cut for hay. When cattle have been yarded over night, it would be well to throw their droppings into small heaps or beds, and cover them at least with a sufficient quantity of earth to prevent fermentation, or absorb its products. This would cost but little labor, and would much enhance the value of the manure.

It has been, and we believe in some instances still is in vogue among farmers, to turn over and mix barn-yard manure several times before it is carried to the field. This practice, however, is exploded among the best informed cultivators. Mr. A. Young says 'no turning, but if circumstan-

* Agricultural Chemistry.

ces of the richness, quantity, or weather have occasioned too much fermentation, or this is suspected, scatter every now and then a quantity of the same earth over the surface, with which the yard was bedded. This may be so proportioned as to keep the mass from too much fermentation.'

It is remarked by the author of *Letters of Agricola*, that 'Earth is a powerful absorber of all the gases which arise from putrefaction. The earth possesses not only the property of retaining the putrid steams which are formed from the dung of decomposing bodies within itself, but also of attracting the effluvia when floating in the air. The salubrity of a country depends on this latter quality; as the practice of burying the dung in the earth is founded on the former. The stench proceeding from the dissolution of organized matter never rises through the ground to assail the nostrils, although it is sufficiently offensive from bodies corrupting in air or water. A strongly dunged field, after being ploughed, sown, and harrowed, sends forth a healthful and refreshing smell; a proof that all the putrid vapors, which otherwise would annoy us, are absorbed and retained for the nutrition of the crop. It is on this account that the poorest earth can be enriched in a very high degree by mere exposure to the gases of putrefaction. Put a layer of common soil along the top of a fermenting dunghill, from twelve to eighteen inches thick, and allow it to remain there while the process is carrying on with activity, and afterwards separate it carefully from the heap, and it will have been impregnated with the most fertilizing virtues. The composts, which of late have attracted such universal attention, and occupied so large a place in all agricultural publications, originated in the discovery of this absorbing power of the earth, and in the application of it to the most beneficial of purposes. A skilful agriculturist would no more think of allowing a violent fermentation to be going on in his dunghill, unmixed with earth or other matter to fix and secure the gaseous elements, than the distiller would suffer his apparatus to be set at work without surmounting his still with the worm to cool and condense the rarefied spirit which ascends to evaporation. In both the most precious matter is that which assumes the æriform state; and to behold it escaping with unconcerned indifference, is a demonstration of the most profound ignorance.'

Liquid Manure. Water in its purest state, when it has been distilled or filtered through sand, still retains somewhat of the food of plants. Its component parts, oxygen and hydrogen, under certain circumstances, are seized by vegetables while in their growing state, and converted into the products which form the constituents of all vegetables. But pure water forms a meagre diet for plants. It may support life in vegetables, and some plants will maintain a feeble growth with very little nourishment except what is afforded them by pure water and air. But when water is impregnated with certain salts and gases, particularly such as are evolved during the fermentation and decomposition of vegetable and animal substances, it becomes what is called *liquid manure.* Urine, or the stale of all animals, is water holding in solution certain salts and other substances, which are the *essence of manure*, or the food of plants in a concentrated state.

Fresh urine is a very powerful and efficacious manure, when properly applied, but if not mixed with solid matter it should be diluted with water, as when pure it contains too large a quantity of animal matter to form a proper fluid nourishment for absorption by the roots of plants. Urine is lessened in value, but its useful qualities are not entirely lost, by putrescence. During putrefaction the greatest part of the soluble animal matter that urine contains is destroyed; it should therefore be used as fresh as possible, with the precaution of diluting it with water, or mixing it with earth. Putrid urine, however, is a valuable manure. It abounds in ammoniacal salts; and though less active than fresh urine, is very efficacious.*

According to some writers and practical farmers, the value of the urine of cattle, if properly preserved and applied to the purposes of vegetation, is greater than that of all the dung which the same animals would yield! A letter from Charles Alexander, near Peebles, in Scotland, addressed to Sir John Sinclair, in 1812, for publication, contains much valuable information on this subject. 'This intelligent farmer had long been impressed with the great importance of the urine of cattle as a manure, and he set about to discover, by a long and well-conducted series of experiments, the best method of collecting and applying it. He began by digging a pit contiguous to the feeding-stall, but distinct altogether from that which was appropriated for the reception of the dung. The dimensions of this pit, according to his own ac-

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* See Davy's Agricultural Chemistry.

count, were thirty-six feet square and four feet deep, surrounded on all sides by a wall; and the solid contents were one hundred and ninety-two yards. Having selected the nearest spot where he could find loamy earth, and this he always took from the surface of some field under cultivation, he proceeded to fill it; and found that, with three men and two horses, he could easily accomplish twenty-eight cubic yards per day; and the whole expense of transporting the earth did not exceed four pounds sixteen shillings sterling, [about twenty-two dollars.] When the work was complete, he levelled the surface of the heap in a line with the sewer which conducted the urine from the interior of the building, on purpose that it might be distributed with regularity, and might saturate the whole from top to bottom. The quantity conveyed to it he estimates at about eight hundred gallons; but as this calculation was founded partly on conjecture, for he measured not the liquor, it will be better and more instructive to furnish and proceed on DATA that are certain and incontrovertible. The urine was supplied by fourteen cattle, weighing about thirty-four stone [four hundred and seventy-six pounds] each, and kept there for five months on fodder and turnips. The contents of the pit produced two hundred and eighty-eight loads, allowing two cubic yards to be taken out in three carts; and he spread forty of these on each acre, so that this urine in five months, and from fourteen cattle, produced a compost sufficient for the fertilization of seven acres of land. He states farther, that he had tried this experiment for ten years, and had indiscriminately used in the same field either the rotted cow-dung or the saturated earth; and in all stages of the crop, he had never been able to find any perceptible difference. But what is still more wonderful, he found his compost lasted in its effects as many years as his best putrescent manure; and he therefore boldly avers, that a load of each is of equivalent value.

'It appears, then, that in five months each cow discharges urine which, when absorbed by loam, furnishes manure of the richest quality and most durable effects for half an acre of ground. The dung-pit, which contained all the excrementitious matter of the fourteen cattle, as well as the litter employed in bedding them, and which was kept separate for the purpose of the experiment, only furnished, during the same period, two hundred and forty loads, and these, at the same rate, could only manure six acres. The aggregate value of the urine, therefore, when compared with that of the dung, was in the ratio of seven to six; so that we are borne out by these premises in this extraordinary inference, that the putrescible liquor, which in this province, [Nova Scotia,] and under the management of our farmers, is wasted and annihilated as far as regards any useful purposes, is intrinsically worth more than the dung, as an efficacious and permanent dressing; and if we take into consideration that this latter manure is not treated with any skill and judgment, it will not seem surprising, that the culture of white crops has never been carried here to any extent, since we have despised and neglected the only means of creating them.'*

We apprehend that the farmers of the United States are not, generally speaking, any more solicitous to turn the urine of their cattle to account for manure, than those of Nova Scotia. There are some cultivators, however, who have taken measures to secure this substance, and to apply it to useful purposes. Mr. Robert Smith, of Baltimore, has his stables constructed in such a manner that all the liquid discharges of his cattle are conducted, together with the wash of the barn-yard, into a cistern, pumped into a hogshead, and applied in a liquid state to the soil which it is wished to manure.† This mode of making use of this substance is likewise recommended in the *Code of Agriculture*, as follows: 'The advantages of irrigating grass lands with cow urine almost exceed belief. Mr. Harley, of Glasgow, (who keeps a large dairy in that town,) by using cow urine, cuts some small fields of grass six times, and the average of each cutting is fifteen inches in length. There are disadvantages, however, attending this mode of applying this powerful manure. It must be applied soon after it is formed, or oftentimes the putrefactive process will commence, and deprive it of a part of its efficacy. And as urine is of a scorching quality, it is unsafe to apply it to growing crops in great heat or drought. Hence it is unadvisable to use it, except for grass, after the month of April or May, unless diluted. It is particularly useful in the spring, when the application of liquid manure gives a new impetus to the plant, and makes its growth more vigorous. This manure forces newly planted cabbages in a most remarkable manner.'

If it be true that more manure can be obtained from the stale of cattle than from their dung and litter, in the proportion of seven to six, (as would seem by Mr. Alexander's ex-

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* Letters of Agricola. † See N. E. Farmer, vol. i. No. 6. p. 44.

periments as above detailed,) and that by our common modes of husbandry this stale is nearly or quite squandered away, the discovery is of very great importance indeed to agriculture. It is nothing less than a method by which farmers may, with a small expense, somewhat more than double their usual quantity of stable manure. And if farmers should 'value manure as a miser does his strong box, should grasp after and hoard it as eagerly and anxiously as a covetous man accumulates treasure,'* surely the wise cultivator will not grudge some labor and expense to acquire more than double the usual quantity of so valuable an article. It is very true there are many things to be taken into consideration in all these economical processes. A principal inquiry should ever be, whether the saving will cost more than the benefit arising from it will be worth. Many improvements which are highly valuable in old and populous countries, where labor is cheap and land dear, cannot be advantageously adopted in this country, where the object, in general, is rather to make the most of our labor than of our land. It is to be recollected, likewise, that in New England, during a considerable part of the time in which cattle are usually housed, the liquid manure is soon converted into ice, and in that state must be transferred to the dung-heap, or inconvenient accumulations will take place before a thaw would render it practicable to separate the liquid from the solid parts of the manure. Still, with all these disadvantages, we believe, in most cases, it is highly advisable to preserve the liquid portion of stable manure separate from the solid part; especially where cattle are soiled or horses stabled during all or the greater part of the year.

Manure for Grass Grounds, Top-dressings, &c. An intelligent and scientific cultivator has given the following directions on this subject.

There is scarcely any question on which farmers are more divided than as to the policy of applying manure as a top-dressing to grass lands, in the spring or fall. The reasoning seems to be in favor of spring dressing, and it is supported by many excellent names. But it ought to be known, that intelligent farmers near the metropolis most generally dress their lands in autumn. Besides the reason stated above, that grass lands are less injured by carting over them

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* These expressions, we believe, belong to the Hon. Mr. Peters, of Pennsylvania, but we do not recollect where we found them.

in the fall, it may be added, that it is a season of greater leisure; and although it is confidently asserted, that the manure is wasted by rains and snows, yet much ought to be allowed on the other side for the protection afforded by the top-dressing to the tender roots of the plants during winter; and ought we not to add something for the low temperature of the atmosphere in winter, which prevents evaporation? whatever principles of fertility exist in manure, are in winter carried down into the soil. We are fully convinced that a scorching sun and drying air are more pernicious to manures spread thinly over the surface than any drenching rains can be, unless on declivities, where top-dressings are unquestionably of less value than on level grounds. The fact that farmers who grow rich by supplying the great towns with hay generally adopt the practice of fall dressing their grass lands, deserves weight.

Top-dressing should not be used in the fall for winter grain, because they would be apt to make the young plants come forward too fast and grow so rank that they would be liable to be winter-killed. Top-dressing for wheat, rye, &c. should be applied to the growing crop in the spring or early in the summer, when it is suspected that the land is not rich enough to bring a full crop to perfection.

With regard to the materials for dressing your grass grounds, after your garden is supplied with manure, you may as well cart on to your mowing land all that you can collect from your barn-yards, your stercoraries or dung-heaps, hog-pens, compost beds, night soil, &c. &c. &c. All sorts of dung, however, before being applied to grass land, should be well mixed with loam, sand, or some kind of earth which will imbibe the gas or effluvia of the dung or putrescent manure. We have said before, in substance, that all kinds of putrescent manure (that is, those animal or vegetable substances which are liable to putrefy, mould, and be wasted when exposed to the sun and air) are in a great measure thrown away, if applied to the surface of the soil before being made into compost.* 'Spreading putrescent substances upon the surface of a field of grass ground, is to manure not the soil, but the atmosphere; and is justly condemned as the most injudicious plan that can be devised in an arable district.'† If dung not made into compost nor

* New England Farmer, vol. i. p. 321. † Code of Agriculture.

mixed with earth or any substance which will attract and imbibe its gas, effluvia, volatile products, or (to be more plain) that which causes it to smell unpleasantly, be applied to a field of plough land, it ought to be spread evenly and ploughed, or at least harrowed in immediately. If a farmer's chief dependence is in grazing land, and he has dung, or putrescent manure not made into compost, to apply, we would suggest it for his consideration whether it might not be well, first to spread his dung as evenly as possible over his field, and then spread over the whole at least an equal quantity of good earth or loam. By such means a compost is made in the field after the putrescent manure is applied, and the earth or loam spread over the dung will not only absorb its gaseous products, but in a great measure protect it from being dried by the air or scorched by the sun, till its fertilizing qualities are dissipated. This method of managing with top-dressing for grass land, however, we should suggest merely as an expedient for the saving of labor in cases where farmers have much dung, but little plough land in proportion, and with whom the saving of labor is a very great object. As a general rule, the following maxim of Sir John Sinclair will apply as well in this country as in Great Britain. 'There are strong objections to the application of dung to grass lands; (much of its strength being evaporated, from its being exposed to atmospheric influence;) *composts are greatly to be preferred.* They may be applied at the rate of from thirty to forty cubic yards per acre. To keep grass land in good condition, a dressing to this amount is required every four years. The application of unmixed putrescent manure will thus be rendered unnecessary.'

The mode in which some farmers manage with regard to manuring their grass lands is not only absurd, but ruinous. Early in the fall they cart their dung from their barn-yards and sties, which perhaps had been a year or more accumulating, and of course is finely pulverized and ready to take the wings of every breeze. They place it on a tough sward in little heaps about the size of a two bushel basket. The sun, high winds, rain, and drying atmosphere, all conspire to rob these little heaps of nearly all their fertilizing qualities, and leave little but a dead mass of matter as 'dry as a husk.' Late in the spring, and generally during or just before a dry time, Mr. Cultivator spreads these little heaps (reduced by exposure to wind and weather to about the size of a half bushel measure) over the sward. If the season proves dry, the manure, particularly that part which was collected from the sty, has scarcely any other effect than to assist the sun in scorching the grass. In the mean time the arable land, being left destitute of manure for the sake of *dunging* the grass ground, yields not half a crop. The poor farmer believes his land worn out, and thinks it high time to 'pluck up stakes and be off to the Ohio!'

Unless you have plenty of manure, you had better not apply any dung to your high, gravelly, or sandy soils, but dress them with plaster of Paris. Uneven grass grounds will not admit of top-dressing to any advantage, on account of the manure's being liable to be washed away.

Previous to manuring your grass lands, it will be well to harrow or scarify them. 'Rolling was formerly considered to be indispensable in the management of grass lands, tending to smooth and consolidate the surface, to prevent the formation of ant-hills, and to render the effects of drought less pernicious. But *scarifying* the turf with a plough, consisting only of coulters, or with a harrow so that the whole surface may be cut or torn, is to be recommended when the pastures [or mowing land] are hidebound. That tenacious state rolling tends to increase; whereas by scarifying the surface is loosened, and the roots acquire new means of improved vegetation. This operation seems particularly useful when it precedes the manuring of grass lands; for if well scarified, the ground is so opened, that any manure spread upon it gets at once to the roots; consequently a small quantity thus applied, goes as far as a larger one laid on in the old mode, and without such an operation. Thus the force of the objections to the application of putrescent manure to grass lands is in some degree obviated.'* After such process it may be well to sow grass seeds, to produce a new set of plants, and supersede the necessity of breaking up the soil to prevent its being '*bound out*,' as the phrase is.

It is a bad practice to feed your mowing land very closely in the fall. There should be enough of the after grass left to protect the roots of the grass against the frosts of winter. We have known good farmers who would not suffer their mowing land to be pastured at any time of the year. But if the soil be well dressed with manure it can do but little or any injury to pasture it in the fore part of autumn, taking

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* Code of Agriculture.

care not to let cattle run upon it when wet, and so soft that they would make much impression on it with their feet.

Manure from Swine. Very valuable manure, with a little attention, may be obtained from swine by methods similar to that described by a writer for the New England Farmer, vol. ii. p. 178, as follows:

I usually keep and fatten four hogs in a year. These I keep confined in a yard twenty feet square, with a warm and convenient shed attached thereto as a shelter for them during the night time and in cold and stormy weather. Into their yard I put the scrapings of ditches, the dirt which is continually collecting in and about the dwelling-house and other buildings, together with the straw with which they are littered, frequently clearing it out of their house and granting them a fresh supply. During the summer season I often throw in large quantities of weeds, brakes, and other rubbish that may come to hand, which helps to increase both the quantity and quality of the manure. In this way I make from twenty-five to thirty loads of manure in a year, which answers a more valuable purpose than that which I take from the stable or barn-yard.

The last spring I planted a field containing two acres with corn. One-half of the piece was manured in the hill with ten loads from the hogpen, the other half with the same quantity of the best manure the barn-yard afforded.

A visible difference was to be seen in the growth of the corn through the season, and at the time of harvest the difference was still more discernible. That part manured from the hogpen produced ears generally much larger than that manured from the barn-yard, a great proportion of the stalks bearing two, and many of them three ears each.

Having harvested and measured my corn, I found the result to be as follows: the produce of the part manured from the hogpen fifty bushels, while that of the other part was but forty-two bushels, making a difference of eight bushels in favor of the former.

I have lately taken twenty-eight loads of strong manure from my hog-yard which has been collected the past year, and which will be a sufficient quantity to manure two and a half acres in the hill; and should the difference be as great in its favor the next as it has been this year, the extra produce will more than repay the whole expense of making the manure.

Manures may be divided into two classes. The one is called animal and vegetable or putrescent manures. They consist of decayed and decaying animal and vegetable substances. The other class is denominated fossil manures. The last mentioned do not properly constitute the food of plants, although they enter into the composition of vegetables in minute quantities. Fossil manures stimulate plants, and cause them to take their food faster than they otherwise would. They are like what medical men call *condiments*, and answer the same purpose as respects the economy of vegetables which salt, pepper, spices, &c. effect as regards the animal economy.

The principal fossil manures are lime, gypsum, and marl. We shall make a few observations on each.

1. *Advantages of Lime.* Though there are exceptions to the rule, yet, in general, it may be confidently asserted, that, unless where a soil has by nature enough of calcareous matter in its composition for the purposes of vegetation, it can neither be brought into its most fertile states, nor will other manures be so useful as they ought, if lime or some other calcareous earth be not previously applied. By lime spread upon a moory soil, good herbage is produced where nothing but heath and unpalatable grasses grew before. By the same means, grass lands, instead of yielding nothing but bent, and other inferior grasses, have been covered with those of a more valuable description. The utility of lime to turnips is so great, that, though in the same field, where no lime had been applied the crop died away, yet in the limed part the turnips flourished with unabated vigor. On the Mendip lands in Somerset, by the application of lime, the value of land was raised from four shillings to thirty shillings per acre; and dung, which previous to liming had no sensible effect, operated after its application as on other lands. Macclesfield forest in Cheshire, and vast tracts in the northern and more elevated parts of Derbyshire and adjacent districts, have been astonishingly improved by the same means. The rye lands of Herefordshire in 1636 refused to produce wheat, peas, or vetches; but since the introduction of lime, they have been so fertilized, as to be successfully applied to the growth of every species of corn. In maiden soils of a tolerable quality, the richest manure will not enable them to bring any crops, but those of oats or rye, to maturity; whereas, if they receive a sufficient quantity of lime, crops of peas, barley, or wheat, may be raised to advantage. The benefit resulting from the use of lime has been indisputably

proved in the same farm; for the richer parts that were left unlimed were uniformly inferior in produce to the poorer that had been limed, during a period of not less than twenty-one years, under the same course of management.

2. *The principles on which lime operates as a manure.* Quicklime in powder, or dissolved in water, is injurious to plants; hence grass watered with lime-water is destroyed. But lime freshly burnt, or slacked, forms a compost with vegetable matter, which is soluble in water, and nutritive to plants. Mild lime (as chalk, or quicklime again impregnated with carbonic acid) chiefly operates by improving the texture of the soil and its relation to absorption.

3. *The various sorts of Limestone.* Sometimes limestone is almost perfectly pure, as is the case with marble, which frequently contains scarcely any other substance but calcareous matter. Several sorts of limestone, however, have mixtures of clay and sand, in various proportions, by which the efficacy of the manure, in proportion to the quantity of these substances, is considerably diminished. It is necessary, therefore, to analyze limestone, to ascertain the proportion of pure lime, before it is advisable to use so expensive an article in great quantities, more especially if it must be conveyed from a distance. Bituminous limestone makes good manure. But the magnesian is the species which requires the greatest attention. Limestone sometimes contains from 20.3 to 23.5 of magnesia, in which case it would be injurious to weak soils to apply more than from twenty-five to thirty bushels per statute acre, though in rich soils double that quantity may be used, and still more with peat, on which soil it would have a most powerful effect in producing fertility.

4. *Mode of preparing it for use.* Limestone is burnt in kilns of various constructions. It is applied with advantage to soils recently reclaimed in a caustic state; but is generally *slacked*, by throwing water upon the lumps, until they crack and swell, and fall down into a fine powder. This operation, when it is to be done, should not be delayed; for if properly burnt, calcined lime is easily reduced into a fine powder, which may not be the case if the slacking be postponed. If water cannot easily be obtained, the lumps may either be divided into small heaps and covered with earth, by the moisture of which they are soon pulverized, or made into large heaps, the lumps and earth six inches thick, and the whole covered with earth. Where it can easily be had,

it is a great advantage to slack the calcined limestone for manure with sea-water or urine. When applied to land in a powdery state, lime tends to bring any hard vegetable matter that the soil contains into a more rapid state of decomposition and solution, so as to render it a proper food for plants.

5. *Application.* Summer is the proper season for liming land. That experienced farmer, Mr. Rennie of Phantassie, is of opinion, that the most profitable period for applying lime is when the land is under summer fallow, in the months of June and July, that it may be completely mixed with the soil before the crop is sown. This is also the general practice in other districts. For a turnip crop, it should be laid on early in the spring before the turnips are drilled, in order that the lime may be thoroughly incorporated with the soil, by the ploughings and harrowings it will receive; the land will thus have time to cool, and the lime will not dry up the moisture necessary for bringing the turnips into leaf. For potatoes, lime is not to be recommended, as it is apt to burn and blister their skins. When applied to old ley, it is a good practice to spread it on the surface previously to the land being broken up, by which it is fixed firmly on the sward. One year has been found of use; but when done three years before, it had produced still greater advantages; in the former case, the increase of oats being only at the rate of six to one, and in the latter, that of ten to one of the seed sown. The quantity applied must vary according to the soil. From two hundred and forty to three hundred bushels of unslacked lime may be applied on strong lands with advantage. Even six hundred bushels have been laid on at once, on strong clays, with great success. On light soils, a much smaller quantity will answer, say from one hundred and fifty to two hundred bushels; but these small doses ought to be more frequently repeated. When applied on the surface of bogs or moors, the quantity used is very considerable, and the more that is laid on, the greater the improvement. The real quantity, however, of calcareous matter used, depends upon the quality of the stone. It often happens, that five chaldrons do not furnish more *effective manure* than three, because they do not contain three-fifths of calcareous matter.

6. *Effects of Lime.* Many farmers have subjected themselves to an expense at the rate of ten shillings per acre per annum for the lime they used, and have been amply remunerated. The benefit derived in the cultivation of green

crops is sufficient for that purpose. Such crops may be raised by large quantities of dung; but where calcareous substances are applied, it is proved, by long experience, that a less quantity of animal and vegetable manure will answer the purpose. This is making the farm-yard dung go farther, with more powerful and more permanent effects; and from the weightier crops thus raised, the quantity of manure on a farm will be most materially augmented. Indeed, upon land in a proper state for calcareous application, (as old ley,) lime is much superior to dung. Its effects continue for a longer period, while the crops produced are of a superior quality, and less susceptible of injury from the excesses of drought and moisture. The ground likewise, more especially if it be of a strong nature, is much more easily wrought; and, in some instances, *the saving of labor alone* would be sufficient to induce a farmer to lime his land, were no greater benefit derived from the application than the opportunity thereby gained of working it in a more perfect manner.

7. *Rules for the management of Lime.* 1. It is necessary to ascertain the quality of the soil to which lime is proposed to be applied; and whether it has formerly been limed; and to what extent. In general it may be observed, that strong loams and stubborn clays require a full dose to bring them into action, as such soils are capable of absorbing a great quantity of calcareous matter. Lighter soils, however, require less lime to stimulate them; and may be injured by administering a quantity of lime recently calcined, that would prove moderately beneficial to those of a heavy nature. 2. As the effects of lime greatly depend on its intimate admixture with the surface soils, it is expedient to have it in a powdered state before it is applied, and the drier and the more perfectly powdered the better. 3. Lime having a tendency to sink in the soil, it cannot be ploughed in with too shallow a furrow, or kept too near the surface. 4. Lime ought not to be applied a second time to weak or poor soils, unless mixed with a compost; after which the land should be immediately laid down to grass.*

The following, on the 'Stimulation of Soils,' was written by the Hon. John Welles, of Boston, and published in the New England Farmer, vol. xi. p. 217.

'From a frequent perusal of the benefits derived from lime in its application to soil in Europe, I have been induced for

* Encyclopedia of Agriculture.

more than a score of years, successively, to make use of it for agricultural purposes to the extent of more than one hundred casks annually.

'One of my first experiments arose from a desire to give a top-dressing to a piece of land, which it was otherwise inconvenient to do. The soil was a heavy black loam. Having a quantity of black earth from a trench, (or top stratum,) I procured a quantity of lime. A bottom of four or five buck loads of earth was first placed; then a couple of casks of lime were spread thereon; then earth and lime again, till my materials were used, or the quantity needed was had, at the rate of eight or ten casks to the acre; thus a cask being supposed to produce about five bushels of slacked lime, the cost of which, if the casks are swelled and the lime partly slacked, is eight to ten cents a bushel. This is the most moderate application in Europe, and the cost is about the same.

'This mixture, after lying twelve or fourteen days, was shovelled over, and after some days being found fine and well mixed, was spread from the cart on the ground. To my *surprise* I found the effect produced to be equal to what is usual from common compost manure!

'In England, where lime is most used for agricultural purposes, it is considered that in its crude state, or uncalcined state, it is most beneficial, if pounded or made fine. This, where limestone abounds, it is well to know; but there is little of it in this neighborhood. Encouraged by this experiment, I continued to purchase and apply considerable quantities of damaged and air-slacked lime* in my cultivation, particularly for a low, flat piece of land. This being intersected with small ditches, furnished the earth. I was not able otherwise to procure to mix with the lime. It is not well, however, in such cases, to lower the surface by taking off more than will keep the ditches open. When the earth is tough with sward, &c., it may be made finer by being carted out and put in heaps on the ground, and spread afterwards. Indeed this is done to great advantage in the winter; the poaching the land, or making a rough surface for the scythe, being then well avoided.

'As this land cannot advantageously be ploughed, I have, in applying every third year a top-dressing, as my custom is,

* Lime long exposed to the air, such as sweepings of stores, &c., is of less value and more cheaply obtained.

alternated, giving first a dressing of earth and lime, and at the expiration of three years, a coat of compost manure.

'This has been done on the principle that a more judicious mixture would be made, and a better composition of soil be had. I have been guided herein from general reasoning, not from any proof that the lime might not be repeated.

'It seems, however, to be a prevailing opinion, where lime has been most in use, that it opens the sod and makes it more porous, giving thereby a better action to other manures, which a judicious husbandry should in succession apply. In this application of lime to a grass sward, in a deep springy soil, I have been for a long time well satisfied. It was several years before I undertook the same practice on a light soil, and I did it with less expectation. But I was somewhat surprised to find it equally beneficial.

'So far lime has been mentioned as a component article in top-dressing for a green sward. Its effect will be shown on ploughed land, and in a grain crop.

'With a view of increasing fertility, I frequently have applied on the *side* of the hills of Indian corn a small handful of slacked lime. I so placed it, lest the caustic quality of the lime should prove injurious to the tender plant when it first started from the soil. This is my opinion and practice; though I have often since seen large pieces slacken and expand on the soil without injury to the grass, which in a lively green color pierced through it. This application of lime to the hill I continued for some time, and though small in quantity or effect, I still thought it of *some* advantage. I was led, however, to a more extensive and satisfactory experiment.

'I had a piece of ground of about four acres, of rather light soil, which gave promise of a very small crop of grass. Being without the means of obtaining manure, as I had a quantity of earth of the top stratum taken up on building a wall, I forthwith procured a quantity of lime and mixed it in the manner before mentioned. About the middle of June I had the grass mowed and the land ploughed. The lime compost was then spread and lightly harrowed in. An early sort of yellow corn, which when ripe husked itself, was procured. And my neighbors, who knew the process, were, in the fall of the year, much surprised by the stout ears of golden grain thus unfolded to view!

'I trust enough has been said to show the beneficial use of lime. Whether it acts on the atmosphere only, or as a stimulant to the soil, or actually contains (as is strongly maintained by some) within itself the food for plants, is well worthy of discussion.

'But whether either of these causes separately or they altogether conduce to the nutrition of plants, an advantageous effect of the use of lime on soil seems conclusively to follow. I have endeavored to avoid nice discriminations and have stated my practice plainly, not from its novelty to many of your readers, but because not only a great waste is made of this article, but it is believed that as its average price in good condition, about ten cents, it may be used to good advantage. So also it is with mortar, rubbish of walls and chimneys, plaster, &c., from old buildings. These (and it is somewhat relative to this discussion) I have made use of as a top-dressing to low soil to very good effect.

'It has been observed that if lime is a fertilizer of soil, why is it that where it abounds and often forms an under stratum a greater fertility does not prevail? To this it may be answered that lime is a constituent principle, it is believed, in all soil, and may be supplied, where from experience a deficiency is found. But when it superabounds, as in most other things, excess may be injurious. In all this more experience is wished for as the only safe and profitable guide.'

The following is extracted from a letter from Daniel Buckley, Esq., of Salisbury, Pennsylvania, to J. Buel, Esq., published in *Memoirs of the New York Board of Agriculture*, vol. iii. p. 124.

'The land which I cultivate, according to M'Clure's treatise, is transition, composed of white and yellow clay and limestone, much of the latter appearing on the surface, intermixed with flint. Upon this soil I have made a liberal use of lime, ever since the year 1790, and think I have been well rewarded for the expense and labor, by the increased value of my crops.

'The method of applying the lime which I have adopted in common with my neighbors is, in the first place, to plough up a sod field with a strong team, in the spring or fall; harrow it the way it is ploughed, and mark the field into as many squares as you intend to put on half-bushels, say one hundred on the acre, which will bring the furrows about twenty feet apart each way, and require fifty bushels to the acre. This quantity I have found to be most profitable. When the lime is burnt, and as soon as it is cool enough to handle, it ought to be hauled on the land already marked, and a half-bushel deposited in the centre of each square, in as compact a heap as possible. If water is convenient, I prefer to slack the lime immediately, rather than to wait for rain, as it becomes finer and can be more evenly spread. As soon as it has slacked, it is immediately spread and well harrowed. This method I prefer for Indian corn, barley, oats, rye, and potatoes. On all the above crops I have experienced a great benefit from lime the first year after its application. With potatoes I add about fifteen two-horse loads of barnyard manure to the acre, before planting. A second liming is often given, and much approved of, after an interval of three or more years. This amalgamates better, and can be more intimately mixed with the soil.

'There are good farmers who differ as to the quantity of lime that is most profitably applied; some say sixty bushels on the acre, some seventy, and some more. I have applied one hundred on an acre of limestone land, at a dressing; but have not been able to discover any benefit from using it thus freely, nor any injury except in the loss of lime.

'Wheat seldom receives any benefit from lime until the second or third year after it has been applied, except it has been mixed in a compost of yard manure and earth. This method is much practised in the lower counties of this state; though not by good farmers until they have applied lime as the basis of melioration. By this management they have raised their lands from an impoverished state, produced by injudicious cropping, to such a state of fertility, as, I am informed, to enable them to fatten a bullock of six hundred weight on an acre, and to cut grass from the same acre sufficient to winter another.

'Sandy soils are greatly improved by the use of lime. I lately purchased some of that kind, which was originally covered with chestnut timber, and was called mountain land. It has been cleared seventy years; but lying a distance from the farm buildings, had never received any manure but a dressing of lime. This land I have had repeatedly farmed since I owned it; and although to appearance it seemed to be almost a *caput mortuum*, with the aid of ten or twelve four-horse loads of the gleanings of a yard of a public house, it has produced as much, and as good, wheat, rye, oats, timothy, and clover to the acre, as any land in the township in which it lays. I consider the liming which it had fifty years ago as the principal cause of its fertility.

It is a general opinion amongst good farmers, that liming should be repeated every ten or fifteen years, and that the increased crops richly compensate the expense. It matters very little how it is applied, provided it is evenly spread immediately after it is slacked. If suffered to air-slack, or to lie after it has been water-slacked, it re-imbibes carbonic acid, which the fire had expelled, becomes lumpy, and is more difficult to be incorporated with the soil. Some spread it upon the sod and plough it under, and think they have as much profit from it in this way as in any other. When thus applied, it powerfully contributes to decompose the tougher fibres of the sod, and to convert them into nutriment for the crop.'

Gypsum, or Plaster of Paris. It is said that the properties of gypsum as a manure were first discovered in Germany by a laborer at a quarry of that substance. In passing across a meadow to shorten the distance home, he observed the luxuriance of the grass where he had walked, and supposing it to be caused by the dust of the gypsum from his feet and clothes, made experiments, which verified his supposition.

Great differences exist among agriculturists respecting the uses of gypsum and the manner of its operation. Some have supposed that its efficiency as a manure is altogether owing to its power of attracting moisture from the air. But Sir Humphrey Davy expressed an opinion, that but little effect can be produced by such attraction. 'When combined with water,' he observed, 'it retains that fluid too powerfully to yield it to the roots of the plant, and its adhesive attraction for moisture is inconsiderable; the small quantity in which it is used likewise is a circumstance unfavorable to this idea.' Some have supposed that gypsum assists in the putrefaction of animal substances, and the decomposition of the manure in the soil. This philosopher, however, proved by repeated experiments, that it rather retards than accelerates putrefaction. He likewise says, 'In examining the ashes of sainfoin, clover, and rye grass, I found that they afforded considerable quantities of gypsum; and this substance probably is intimately combined as a necessary part of the woody fibre. If this be allowed, it is easy to explain why it operates in such small quantities; for the whole of a clover crop, or sainfoin crop, on an acre, according to my estimation, would afford by incineration only three or four bushels of gypsum. The reason why gypsum is not generally more efficacious, is probably because that most cultivated soils contain it in sufficient quantities for the use of the grasses. In the common course of cultivation gypsum is furnished in the manure; for it is contained in stable dung, and in the dung of cattle fed on grass. Lord Dundas informs me, that having tried gypsum without any benefit on two of his estates in Yorkshire, he was induced to have the soil examined for gypsum, and this substance was found in both soils.'*

It has been made a question whether burning and calcining gypsum make any difference with regard to its fertilizing properties. This is said to be the practice among French cultivators, and was likewise recommended by Dr. Deane. But an English writer on agriculture observes that 'calcining is not likely to make any difference, because the sulphuric acid in gypsum cannot be expelled by the most violent heat of the furnace; and an experiment of Arthur Young countenances the assertion that the effects of gypsum are the same, whether calcined or rough.'

Dr. Joseph E. Muse, of Maryland, in an essay on the subject of gypsum, and its mode of operation, published in the American Farmer, vol. i. p. 338, gives it as his opinion 'that the chief, if not the only cause of the efficacy of gypsum in promoting vegetation, is to be found in its tendency to become phosphoric, and produced many facts and deductions therefrom, to show that gypsum by exposure to the atmosphere becomes phosphoric; and that phosphorus exists in vegetables.

The late Dr. Gorham, in a paper read before a society in Boston, and published in the New England Farmer, vol. v. page 153, observed, 'When plaster of Paris is applied to the seed it stimulates the little root, the action of the vessels is thus increased, absorption goes on more rapidly, and it acquires more nourishment for a given time than in ordinary circumstances; the consequences are a quick growth and enlargement of the organs.'

Colonel Taylor, of Virginia, observed, in substance, that he sows of plaster from three pecks to one bushel to the acre. Sown on clover in the spring, it benefits it considerably. The best way of using it is in the spring upon the long manure of the preceding winter, to be ploughed in with it. He thinks it a valuable ally, but by no means a substitute for manure. That there should be intervals of two, three, or four years between applying it to the same land.

* Elements of Agricultural Chemistry, lecture vii.

That its effect is graduated by the quantity of vegetable matter on which it is sown. That on closely grazed land it does little good at first, and repeated would become pernicious; and that it must be united either with long manure of the winter, or the ungrazed vegetable cover produced in the summer. That all crops are ultimately improved by its improving the soil, even when its effects are not immediately visible; but he does not recommend it as a top-dressing, except for clover.

M. Canolle, a French writer, observes, that plaster, acting chiefly on the absorbent system of plants, its effects are not like those of manure buried in the soil, which act principally on the roots. The latter, according to their *particular nature*, divide, soften, enrich, warm or stiffen the sods with which they are mixed. The quantity of plaster spread upon the land is so trifling that it can have little effect on the soil. I speak from experience. Plaster buried in the earth where sainfoin has been sown, has produced little alteration; whilst the same quantity of plaster spread over the same surface of sainfoin has produced the most beautiful vegetation.

'From this experience, so uniform in the application of plaster, I am led to believe, that one must consult as well the nature of the soil, as the kind of plants to which we apply plaster. Thus, whatever may be the soil, on which clover, lucerne, and sainfoin naturally flourish vigorously, or with that vigor which encourage us to apply manure, there is no risk in trying plaster.

'It is to be remarked, that plaster operates on plants in a direct ratio to the size and number of their leaves. I have spread plaster on land where sainfoin was mixed with the common grasses which compose our meadows. The growth of the sainfoin and wild honey-suckle has been beyond comparison greater than that of the common grasses. It is to this cause I attribute the failure of success on grass ground chiefly filled with common grasses. I have a field of lucerne separated from a natural meadow only by a brook. I have greatly increased the lucerne by the plaster, whilst the effect of a like quantity on the adjoining grass land was scarcely, if at all perceivable.

It has been ascertained by repeated experiments that a liberal application of plaster to clover, at the time of turning it down and preparing for a wheat crop, is by far the most advantageous to the crop, and much preferable to turning in the clover in the usual way, and plastering on the surface. The action of the plaster, thus excluded from atmospheric air, upon the clover, covered over, is instantaneous, and the putridity is so certain as to cause considerable gas, which in its passage through the clod impregnates it with all its manuring qualities, and the root of the plant shoots down and feeds on a bed of manure.*

A writer for the New England Farmer, vol. ii. p. 10, states in substance as results of his experience, that plaster was found by him to be useful as manure, after having been kept on hand in a box seven years; that its beneficial effects on pasture land are very great. He sows it on the same piece of ground every second year, and thinks five or six pecks to an acre are sufficient; that his pasturing is essentially improved by that application, producing nearly double the quantity of food which it formerly did; that sowing plaster on his grazing land had a tendency to destroy the bushes, by giving increased luxuriance to the grass; that this manure has been found very useful for flax and potatoes, &c.

Dr. Cooper, editor of the last Philadelphia edition of Willich's Domestic Encyclopedia, says, 'Gypsum will not answer beyond two and a half bushels to the acre; one and a half bushel is better. It will not answer on wet or swampy, or clayey soils. It should be scattered over the ground as a top-dressing. Suppose you were asked if a stone brought you is gypsum. 1. Gypsum can be scratched by the nail, scraped by a knife, ground by the teeth. 2. It will not dissolve in spirits of salt as limestone will: nor is it half so hard as limestone. 3. Its color and crystalline appearance distinguish it from clay; nor does it give a clayey odor when breathed upon, unless clay be mixed with it. 4. Powder it, boil it to dryness, with four times its weight of pot or pearlash. Wash out all that the hot water will dissolve; the remaining powder (if the stone be gypsum) is carbonate of lime.'

Gypsum has been highly recommended as a manure for potatoes. The potatoes, just before planting, should be wet and rolled in pulverized plaster; and a handful of plaster applied immediately after the first and second hoeing to the leaves, and scattered over the hill.

A writer for the Genesee Farmer, with the signature Onondago, observes, 'Plaster is always to be sown on wheat

* American Farmer.

unless the land is wanted for a spring crop the next year, after clover seed, at the rate of one, two, or even three bushels per acre. After harvest the young clover ought not to be pastured much, if any; the next year the clover is suffered to grow as large as it can be and be well turned over, which is then done, the ground fallowed and the wheat sown; the next year sow the clover seed and plaster, and so on from year to year ad infinitum, the land always getting better, as is supposed by those who practise this method. Plaster we think should be sown in pasture. An old farmer, and one who has proved his skill by making a fortune at the business, and who now tills nearly five hundred acres, told me that a ton of plaster sown on ten acres of pasture would make it yield as much as fifteen acres under the like circumstances without plaster.'

J. Spicer, in Goodsell's Farmer, says, 'When I apply plaster to corn, which I have done for nearly three years past, I mix it with one-half leached ashes, as they are leached for common family use; put it in a cart and shovel and mix it well. I then put one gill to the hill immediately after the first hoeing, and the same thing over after the second hoeing. I have tried the same quantity of clear plaster, side and side, twice, and find the mixture to produce the greatest effects.'

The Hon. J. Lowell, in an article published in the New England Farmer, vol. v. p. 1, contradicts an idea which has been generally prevalent, that gypsum is of no use to lands near the sea-coast, and observes as follows:

'I shall set out with the fact, that plaster has been used with success on lands on the sea-coast of France, where the south-west wind, the prevalent one in summer in that country, brings with it the ocean air: and in our country, in Massachusetts for example, the prevalent winds do not bring with them an atmosphere filled with saline particles. It cannot therefore be the vicinity to the sea which renders gypsum inert and inefficacious with us. The cause of its inefficacy near the sea-coast must therefore be sought for in something else; in the nature of our soil, perhaps already sufficiently imbued with the constituent parts of gypsum, or in our more free use of stable manure, which furnishes the plants with all the food they require.

'I have been in a constant and invariable course of experiments on plaster, and these are the results. It seems to be of no use, *ever*, to *clover*, on low meadow lands; of no use to *any* plants on a good rich, well manured soil. But I have three decisive proofs of its utility on dry, hilly, gravelly soils.

'The first I shall mention was an experiment made by the late RALPH SMITH, Esq., of Roxbury, on a lofty hill of old pasture land. He applied it for several years, and his own conviction was, and it was also the full conviction of many others, that it materially improved the condition of his pasture. It was green at an earlier period, and the white clover came into it more generally and luxuriantly than into other lands in the same situation.

'Seven years since, I applied plaster to a newly laid down field of clover, one-half of which was a dry gravelly knoll, with very little vegetable soil. When it was fit for cutting, I showed it to the trustees of the Massachusetts Agricultural society, and without pointing out to them the part to which the plaster had been applied, they at once, on sight of it, detected and pointed out the superiority of the crop on the part to which the gypsum had been applied; and their designation agreed, by metes and bounds, with the stakes I had driven, indicating the part to which plaster had been applied, and which were then concealed by the grass. This superior crop was on a pure gravelly soil, far inferior to the rest, which was a deep rich loam.

'This year I had a piece of clover in its second year of growth. It was similarly situated. Two-thirds of it was a gravelly thin soil. I cut the whole on the 10th day of June. The gravelly part, owing to the drought, did not yield more than half a ton to the acre; the rich part an excellent crop. As soon as the hay was in, I gave a dressing of plaster to the gravelly knoll *only*, at the rate of three bushels to the acre.

'The effect has been as great as has ever been represented to be produced by gypsum by persons in the interior. The second crop on the gravelly land is *far superior* to that on a rich and deep soil in the *same* field. It may be discovered at ten rods' distance; and you can mark by your eyes precisely the line of the ground to which the plaster was applied. You, sir, have seen this spot of half an acre, and can testify whether its effects are not very obvious. I shall not cut it for some weeks, unless compelled to it by a second drought, and I invite farmers to see the effect of this experiment, not new, because it is but a repetition of an old one.

'I am induced to lay this subject before the farmers of Norfolk, Bristol, Barnstable, and Essex, because I am convinced that the experiment of the use of gypsum in this quarter has not been fair and full.

'It is of no service on low lands, or on good land, nor of much use to any products except to clover and lucerne; but on sandy and gravelly soils, and applied to these plants, especially in dry seasons, I am convinced it will prove valuable. I paid only four dollars for ten bushels, ground; and I applied only sixty cents' worth to this land, and am convinced, that the plaster will increase the value of the second crop to five times the cost of the application.'

A writer for the Genesee Farmer, with the signature V. W. S., recommends to sow plaster from the box of a wagon, driven slowly over the field in which it is to be distributed. He sowed five and a half bushels of plaster over four acres of meadow in just an hour, and performed his work *well;* sowed the ground twice over, extending the cast each time to the track the wheels last made, by which the driver guided his course across the lot. The writer recommends a windy day for his purpose, and believes a yoke of cattle might be preferable to a horse.

'It will be readily perceived that while my mode of sowing plaster makes a great saving of manual strength, the great advantage derived from it is in the expedition with which the process is performed. One man and boy, in a one-horse cart, can dress from forty to sixty acres per day, thus making a very important saving of time at a season when the farmer is obliged to husband closely. The injury of driving a wagon over a field of grain would be but little, and could not be considered a moment, when compared with the value of the time gained. Let any farmer try it, and I am satisfied he will never sow plaster from a pail on foot again.

'I would add here, that in sowing from a wagon it will be found necessary to stop occasionally, to pick up or loosen the plaster, which becomes compacted by its motion. The elevated position of the sower enables him to make a very broad cast, and if advantage is taken of the wind, he will be able to avoid the respiration of any great quantities of dust.'

Marl consists of calcareous matter, clay, and sand, or some two of these earths, (of which lime or chalk is always one) in various proportions. The blue clay marl is free from sand. Clay marl is also sometimes of a yellowish white, yellowish gray, or a brown or red cast. The shell marl seldom contains clay. In schistus or stone marl, sometimes sand and sometimes clay preponderates, generally the former. The sand marl, whether shell or schistus, should be applied to clays; and clay marls to sands. In both cases they correct the defects of the soil, by rendering it, in the first, less adhesive; and, in the latter, less open and porous.

The earths are not the food of plants. They constitute the stomach, analogous to the stomach of animals, in which vegetable and animal matter is received, digested, and with the aid of the leaves [lungs] assimilated to vegetable chyle and blood. The best soil for this digestive process is that in which the three above-named earths are suitably blended.

A sandy or gravelly soil is called hungry, because it digests rapidly, and dissipates the food committed to its bosom. Hence green crops, or frequent manurings, are necessary to continue it healthy and productive. Such soils are defective in clay and calcareous matter. Their texture may therefore be improved, and their fertility increased, by the application of clay marl; or, what is the same, by clay and lime separately; though these materials are found most pure and best blended in the substance of marl. The quantity should be proportioned to the natural deficiency of these materials in the soil. From eight to one hundred loads per acre have been applied in one or two dressings; and their beneficial effects have been known to continue thirty years. All the sand soils of Norfolk, England, have been marled, [clayed.] Calcareous matter, combined with sulphuric acid, [oil of vitriol] is usefully applied to soils in the form of gypsum, or plaster of Paris; as is also powdered limestone and chalk, both calcareous. I am induced to believe that neither wheat nor sainfoin grass will thrive in a soil destitute of calcareous matter, which is the condition with most of our sands.

A stiff, moist clay, is called *cold*, and is unfriendly to the finer grasses as well as grains. Its texture is too compact to permit the roots to extend freely, and its temperature too cold to carry on the digestive process sufficiently rapid for the plants which grow upon its surface. Sand and lime, or silicious marl, loosen its texture, render it permeable to heat, &c., and powerfully assist to concoct the food of vegetables.

Marl may be known by the most ordinary observer. The application of a mineral acid, and even of good vinegar, will cause an effervescence. This is the operation of the acid upon the lime. Its silicious and argillaceous properties may be ascertained by the sight and feeling, by the aid of water, or of glass. Sand subsides or settles quicker than clay in a liquid; and will scratch glass, which clay will not.

It is a remarkable fact in the economy of nature, that the indigenous plants of every country are precisely those which are best adapted to furnish the proper sustenance to its animal population, and to satisfy its medicinal wants. So in regard to our soils; every district generally affords the means of producing fertility. Hence the clay marls generally underlay sands; and shell and sand marls most abound in the neighborhood of clays. And in addition to the variety of fossil substances which are calculated to increase fertility, every thing that grows upon the earth, every particle of animal and vegetable matter, is reduced to air and water by the chemical operations of nature, and in these forms become the food of new plants, to nourish animals. It is a truth calculated to teach humility, that the animal, the vegetable, and the putrid mass of dung, are found on chemical analysis to be very nearly alike, and that, in the natural order of things, they constantly nourish, feed, and produce each other. 'Nothing is nourishment for a vegetable but what enters into the permanent composition of a vegetable. Nothing is nourishment for an animal but what was originally a vegetable.' Man is enjoined to earn his bread by the sweat of his brow. He finds the most noble incitements to duty scattered around him, and he is seldom disappointed in obtaining the rewards, competence and health, which industry promises to her votaries. But I have another remark to make as to the food of vegetables. How scrupulously careful is the farmer of his grain, hay, and roots, which are destined to nourish and fatten his animals; and yet how thoughtless and inattentive as to the food of his plants! Vegetable and animal substances are suffered to waste in his fields and yards, unmindful of the havoc which the rains, winds, and sun, are daily making upon them; while a moiety of his fertilizing materials, the urine of his stock, is altogether lost. He will not suffer the flocks of his neighbors to rob his own of their food; yet he sees, with but feeble efforts to prevent it, his plants plundered by pestiferous weeds of the food which is essential to their health and vigor.

'To find the composition of a marl, pour a few ounces of diluted muriatic acid into a Florence flask; place them in a scale, and let them be balanced: then reduce a few ounces of dry marl into powder; and let this powder be carefully and gradually thrown into the flask, until, after repeated additions, no farther effervescence is perceived. Let the remainder of the powdered marl be weighed, by which the quantity projected will be known. Let the balance be then restored. The difference of weight between the quantity projected and that requisite to restore the balance, will show the weight of air lost during effervescence. [That air proceeds from the calcareous earth alone, which contains forty-four per cent. of this carbonic acid air. Suppose five hundred grains of marl lose forty-four grains by the escape of air, then that marl contained one hundred grains, or one-fifth of its whole weight, of limestone.—T. C.] If the loss amount to twenty or twenty-five per cent. of the quantity of marl projected, the marl assayed is calareous marl, or marl rich in calcareous earth. Clayey marls, or those in which the argillaceous ingredient prevails, lose only eight or ten per cent. of their weight by this treatment, and sandy marls about the same proportion. The presence of much argillaceous earth may be judged by drying the marl, after being washed with spirit of salt, when it will harden and form a brick.

'To determine with still greater precision the quantity of calcareous earth in marl, let the solution in muriatic acid be filtered and mixed with a solution of carbonate of potash, till no farther precipitation appear. Let the sediment subside; wash it well with water; lay it on a filter, previously weighed, and dry it. The weight of the dry mass will show how much carbonate of lime the quantity of marl submitted to experiment contained. See KIRWAN on MANURES.

'The quantity necessary to be used, varies according to the nature of the soil; but the utmost caution is requisite, because if too large a portion be scattered on the land, it cannot be easily removed, and if too little be employed, the deficiency may be readily supplied. On sandy, gravelly, or light soils, it will be advisable to spread as much as will form a thick coat, in order to bind and stiffen the ground. But, of whatever nature the land may be, the most judicious cultivators recommend such a portion to be laid on it, as will form a thin coat over the whole surface.

'The proper season for *marling* is the summer; as this kind of manure is then perfectly dry, and not only lighter, but also more easily reduced to a powder. Marl, however, may be advantageously spread during the winter frosts; as in the latter season, there are few opportunities of performing other labors of the field.

'Previously to marling, the land ought to be diligently cleared from all weeds, and rendered level, both with the brake and the common harrow, so that the marl may be equally spread on the surface, where it should be suffered to lie during the winter. In the month of February, [March, or April,] and in dry weather, it will be proper to draw a bush-harrow, well weighted, over the land, that the marl may be uniformly distributed; but, as this manure is very ponderous, and sinks to the bottom of the furrow, if injudiciously ploughed in, it has been suggested to turn it into an *ebb-furrow* for the first crop: during the growth of the latter, the marl will incorporate with and become a part of the soil, from which it does not readily separate. So permanent, indeed, are its fertilizing properties, that if land be properly marled, it will continue arable for the space of twelve or fourteen years; and, for pasture, during a much longer period.

'A good *artificial marl* may be prepared by mixing equal quantities of pure clay and lime, in alternate layers, so as to form a heap, which should be exposed to the winter frost: this compound is well calculated for light lands; but if the soil be strong and heavy, it will be necessary to substitute loam and sand for the clay. Such compositions may be usefully employed where marl is not easily procured; as they will amply repay the labor bestowed on mixing them, being little inferior to the genuine calcareous earth.'—*Domestic Encyclopedia.*

An English writer on agriculture observes that 'whoever finds marl finds a mine of great value. It is one of the best and most general manures in nature; proper for all soils, and particularly so for clay.' It is usually found under moss or peat, in low sunken lands, and especially nigh the sea or large rivers. It has been sometimes discovered by ant-hills, as those insects bring up small pieces of shells from their holes.

Peat is a well known substance, used both for manure and for fuel. In its natural state peat is of but little or no service as manure, but by exposing it to the effects of fermentation it becomes very useful as food for plants. In its unfermented state it contains a considerable quantity of tannin, which is a powerful astringent, resisting all approaches to putrefaction; and is impregnated with acids injurious to vegetation, which can be expelled by fermentation with barn-yard manure, and other suitable substances.

The following method of preparing peat for manure is extracted from a small treatise by lord Meadowbanks, which was printed and distributed gratis among the Scottish peasantry, and has been highly approved of both by practical and scientific cultivators.

'Let the peat-moss, of which compost is to be formed, be thrown out of the pit for some weeks or months, in order to lose its redundant moisture. By this means it is rendered the lighter to carry, and less compact and weighty, when made up with fresh dung for fermentation; and accordingly, less dung is required for the purpose, than if the preparation is made with peat taken recently from the pit. The peat taken from near the surface, or at a considerable depth, answers equally well. And the more compact the peat, and the fitter to prove good fuel, so much the more promising it is to be prepared for manure.

'Take the peat-moss to a dry spot, convenient for constructing a dunghill, to serve the field to be manured. Lay the cart-loads of it in two rows, and of the dung in a row betwixt them. The dung thus lies on the area of the compost dunghill, and the rows of peat should be near enough each other, that workmen in making up the compost may be able to throw them together by the spade. In making up, let the workmen begin at one end; and at the extremity of the row of dung, (which should not extend quite so far at that end as the rows of peat on each side of it do,) let them lay a bottom of peat, six inches deep, and fifteen feet wide. Then throw forward, and lay about ten inches of dung above the bottom of peat; then four or five of dung; and then cover it over with peat at the end where it was begun, at the two sides, and above. The compost should not be raised above four feet and a half high, otherwise it is apt to press too heavily on the under parts, and check the fermentation: unless the peat, when dry, be very puffy and light, and then a much greater height is desirable. Neither should it be much lower, otherwise it will prove wanting in the compactness, and soon also, if the weather is very dry, in the moisture required for the ingredients of which it consists to act chemically on each other. When a beginning is thus made, the workmen will proceed working backwards, and adding to the column of compost as they are furnished with the three rows of materials directed to be laid down for them. They must take care not to tread on the compost, or render it too compact; and of consequence, in proportion as the peat is wet, it should be made up in lumps, and not much mashed or broken.

'In mild weather, seven cart-loads of common farm-yard dung, tolerably fresh made, is sufficient for twenty-one cart-loads of peat-moss; but in cold weather, a larger proportion of dung is desirable; at least it is prudent to omit putting any peat between the two upper layers of dung, and rather thicken the outer coating with peat. It is also proper in winter, if ground with a dry bottom can be conveniently employed for the purpose, to increase greatly the breadth of the dunghill, which, in that case, may be done without any limit, by adding, all round the dunghill, circles, consisting of layers of dung and peat, of seven feet in breadth. And if the mass of the dunghill is thus enlarged, there is little occasion to exceed the proportion of dung recommended for making up to prepare in the milder season; especially if a covering of coarse vegetables of any sort, such as waste hay or straw, rushes, broom, or furze, or brushwood of evergreens, is thrown over the dunghill. In fact, a covering of this sort is scarce less useful in summer to prevent the escape of moisture, than in winter to exclude cold.

'To every twenty-eight cart-loads of the compost, when made up, it is of use to throw on above it a cart-load of ashes, either made from coal, peat, or wood; or if these cannot be had, half the quantity of slacked lime may be used, the more finely powdered the better. But these additions are in nowise essential to the general success of the compost, provided a sufficiency of time is allowed to the preparation to compensate for the want of them.

'The dung to be used should either have been recently made, or kept fresh by compression; as by the treading of cattle or swine, or by carts passing over it. And if there is little or no litter in it, a smaller quantity will serve, provided any spongy vegetable matter is added at making up the compost, as fresh weeds, the rubbish of a stack-yard, potato-shaws, sawings of timber, &c. And as some sorts of dung, even when fresh, are much more advanced in decomposition than others, it is material to attend to this; for a much less proportion of such dung, especially if abounding in animal matter, as is less advanced, will serve for the compost, provided care is taken to keep the mass sufficiently open, either by a mixture of the above-mentioned substances, or, if these are wanting, by adding the peat piecemeal, that is, first mixing it up in the usual proportion of three to one of dung, and then, after a time, adding an equal quantity, more or less, of peat. The dung of this character of greatest quantity is shamble-dung, with which, under the above precautions, six times the quantity of peat, or more, may be prepared. The same holds as to pigeon-dung and other fowl-dung; and to a certain extent, also, as to that which is collected from towns, and made by animals that feed on grains, refuse of distilleries, &c.

'The compost, after it is made up, gets into a general heat, sooner or later, according to the weather and the condition of the dung; in summer, in ten days or sooner; in winter, not perhaps for many weeks, if the cold is severe. It always, however, has been found to come on at last; and in summer, it sometimes rises so high as to be mischievous, by consuming the materials, (fire-fanging.) In that season, a stick should be kept in it in different parts, to pull out and feel now and then; for if it approaches to blood-heat, it should either be watered or turned over; and on such an occasion, advantage may be taken to mix with it a little fresh peat. The heat subsides, after a time, and with great variety, according to the weather, the dung, and the perfection of the making up of the compost; which then may be allowed to remain untouched, until within three or four weeks of using, when it should be turned over, upside down and outside in, and all lumps broken: then it comes into a second heat, but soon cools, and is fit to be taken out for use. In this state the whole, except bits of the old decayed wood, appears a black free mass, and spreads like garden-mould. Use it, weight for weight, as farm-yard dung; and it will be found, in a course of cropping, fully to stand the comparison.'

Many other articles are useful for manure, such as blood, offals of animals, hair, refuse feathers, woolen rags, hoofs and horns of cattle, sheep, &c.; bones of all kinds, pounded, broken, or ground, at the rate of sixty bushels to the acre; raw skins; fish of all kinds; swamp mud, river mud, pond mud and sea mud, wood ashes, turfs, sea-weeds, moss mixed with dung in holes—good for potatoes, turf from highways, &c.; shells of shell-fish; scrapings of streets and back yards; rubbish of old houses, and earth which has long been under cover. Both of these collect and retain nitre. Old brine of salted meat or fish, which contains, besides salt, some blood, oil, &c., in composts. Sea water, which contains other substances besides water and salt, which are fit for nourishing plants. Soap-suds, replete with a prepared food for plants; excellent for watering gardens in dry weather. None of this should ever be lost. If the garden be distant or wet it may enrich the dung heap. Water in the hollows of farm-yards. Instead of suffering this liquor to soak into the earth, it should be taken up by straw litter, or some absorbent substance thrown into it, or carried out in a water-cart, and sprinkled over land which needs it, in the manner in which streets are watered in cities.

In the New England Farmer, vol. ix. p. 245, was published an article written by Hon. John Lowell, to the Hon. Thomas L. Winthrop, president of the Massachusetts society for the Promotion of Agriculture, from which the following is extracted:

'A few years since, the Hon. William Ellis, of Dedham, recommended to me the use of the head and feet bones of oxen, as a highly valuable manure on meadow lands. He said he had observed in passing, that I had grounds remarkably well adapted for this manure. I, however, neglected this hint, though I constantly kept it in mind, until the last year, when, seeing an immense load of the heads of oxen passing by, I inquired of the owner for what purpose he was carting these materials, and he answered me to the following facts, viz.: that he came down a distance of eight miles with an empty team, and was carrying back a load, which cost him two dollars, to put on his meadow land. I found it was no new experiment with him, and that he came often for that purpose.

'I made the experiment. Its success surpassed all his descriptions. The manure brought in new grasses. It encouraged and invigorated the old.

'I am aware it is only of limited application, but it is no trifling thing to render useful an article formerly thrown away. We know so little of the philosophy of manure, that I shall not speak positively on the subject. All I shall say is, that there is much animal matter still adhering to the bones, and animal matter has been found by experience to promote the growth of vegetables.

'The mode of application is to break them up with a sledge, or with the back of an axe, and then to press them below the surface by a rammer or beetle. The only point to which I offer my testimony is that *the effects are much* *greater* than an *equal quantity* of horse and cow dung. **This may be relied on.**'

FENCES. The kinds of fence and manner of fencing should vary according to the difference of soils and the kinds of materials for fencing. In new lands logs are and ought to be most used. When built of white pine, they will last about twenty years. Other sorts of wood, such as pitch pine, hemlock, ash, oak, &c., will endure for a considerable time if not placed too near the ground. If a fence be made partly of white pine and partly of other wood, the former should be laid nearest to the ground. If logs are pealed they will last the longer in fences.

It has been practised by some farmers to make posts for fences very durable by the following simple process. They bore a hole in that part of the post which, when set, will be just at the surface of the earth, with such a slope as will carry it downward an inch or two. They then fill the hole with salt, which will preserve the timber a long time from decay.

In many parts of the country posts and rails will be found the cheapest materials for fence. In making fences of this description, it is advised by Mr. Preston, of Stockport, Pennsylvania, to set the posts with the top parts in the ground, and he asserts that they will, in that position, last three or four times as long as when they are set with the butt ends down. He advises, also, in making fences, always to place the rails with the heart side up.

The best timber for rails, according to Dr. Deane, is red cedar. It is easy to split, light to carry and handle, sufficiently strong, and the most durable of any. In the Transactions of the Society of Arts, in England, there is an account which states in substance that posts of oak, and others of chestnut, were set down in Somersetshire, where they had to undergo repairs in eighteen years. The oak posts were then found to be unserviceable, and the chestnut very little worn. The oak posts were renewed, the chestnut remained, and in twenty-five years afterwards they were not so much rotted as the oak.

If the lower ends of posts are scorched in a hot flame before they are put into the ground, they will last the longer. Some recommend soaking them in sea-water to keep them from rotting. The posts should be set at least two feet in the ground. Some farmers cut their posts so long, and mortise them in such a manner, that they can turn them upside down, when the lower ends become rotten.

It is said in the Barnstable Journal, that ' deacon Winslow Martin has on his farm a kind of fence, which for durability and beauty can hardly be exceeded. On each side of the road adjacent his dwelling are rows of large buttonwood trees, set ten or twelve feet asunder. Into these, when young, cedar rails were inserted, as into common posts. As the trees increased in size, the wood formed closely around the ends of the rails, and firmly secured them in their places. It is certainly a durable and cheap fence, because it will require no repairs at least for one generation, and is moreover constantly increasing in value. Were our roads lined with this kind of fence, it would add not a little to the beauty of the country and the comfort of the traveller.'

The Farmer's Guide observes, that ' post and rail fences and board fences are very good where the soil is dry. In a wet soil, the posts will be moved by frost. Red cedar, locust, and chestnut, are best. Butternut, black walnut, and oak, are pretty good, lasting about fifteen years. For the rails, cedar is best, lasting perhaps an age. If timber is scarce, and the ground is level and free from stones, post and rail fences, set in a bank of the earth of two small ditches, thrown up together, ought to be preferred. If the posts are too small to have holes made through them, the rails may be flattened at the ends, and fastened to the posts with spikes, or with wooden pins well secured.'

When ground is wholly subdued, and the stumps of its original trees quite rotted out, stone walls, properly made, are the best and cheapest fences. On hard, sandy or gravelly soil, a wall will stand many years without repairing. On a clay or miry soil, the foundation should be laid in a trench, nearly as low as the earth freezes. But a wall of flat or square shaped stones will stand pretty well on any soil on the surface.

A writer for the Genesee Farmer gives the following directions for ' Planting Posts for Garden Fences, &c.'

' Instead of filling the holes up with the earth taken out in digging them, I would recommend filling in around the posts leached ashes instead of common earth, and topping off with five or six inches of unleached ashes above the surface of the ground; for it is generally between *wind and* *water*, as the sailors term it, that garden posts begin to decay. My reason for recommending ashes is, that I have frequently found pieces of board, hoops, and staves buried under heaps of leached ashes, which had lain there many years, and were quite as sound as when first buried. No doubt many of your readers have noticed the same, in removing old ash heaps near potash works.'

HEDGES. In some soils, situations, and circumstances hedge fences will be found most advisable and economical. The following remarks on this subject, by the Hon. John Lowell, were published in the New England Farmer, vol. x. p. 339.

'It is not my intention to recommend live hedges for this rocky part of the United States. Our own stones furnish the best divisions we could ask for or desire; and on most farms the removal of them from the soil would be economical, and the placing them as partitions for fields is the cheapest and most natural mode of disposing of them. Still, in New England, there are extensive tracts of country of alluvial or diluvial soil in which no rocks are found, and in which a stone wall could not be obtained without great expense. Such is the state of the greater part of the old colony below Plymouth, and of some parts of the county of Middlesex. But wherever wood fences are required it may be useful to substitute live hedges. The question is, what has been our experience as to the comparative value of the various plants employed in New England for live hedges? In the remarks which follow, I beg it may be understood, that I do not intend to oppose the opinions expressed by a learned and judicious horticulturist, judge Buel; nor those expressed by practical gentlemen at the south; but simply the results of my own personal experience and observation, during the last eighteen years, since the subject of live hedges attracted the attention of our cultivators. Nothing which I may say can in any degree impeach the correctness of their statements, because the causes of the failure of certain plants with us may have been entirely *local*. This would not appear remarkable, when we consider that the locust (*robinia pseudocacia*) is absolutely interdicted to us, while it is the favorite and one of the most valuable trees of the south.

'Suffice it then to say, that the Virginia thorn, introduced here by Mr. Quincy, with whom it appeared to succeed, is in most cases utterly useless as a fence. This is chiefly owing to the ravages of a worm at its root; whether it be the same which attacks the apple and the quince, is a point not settled. The same objection is applicable to the English hawthorn. And to this *fatal* one is superadded another, the appearance of a fungus of a yellow color on the leaves, which utterly disfigures them and strips them of their foliage in September. The *gleditschia triacanthos* is not suited for hedges with us. If left to grow they soon grow out of all reach, if checked they are winter-killed. We are indebted wholly and entirely to the experiments of Ezekiel Hersy Derby, Esq. for the possession of a plant, the buckthorn, (*rhamnus catharticus,*) which, from ten years' trial, seems to afford every desirable quality for a healthy, beautiful, and effectual hedge. We refer the public to Mr. Derby's account in the New England Farmer, for particulars.

'I can only say, and I feel it a duty to say, that I have tried this plant for six years. It is hardy and rapid in its growth, of impenetrable thickness, and so far as that extent of experiment enables me to judge, not subject to any disease, or the visitation of any insect whatever. As it is very provoking as well as expensive to cultivators to be led astray, and to find after five or ten years that they have been deceived, they would do well to examine the growing hedges of the buckthorn, or *rhamnus catharticus*, at Mr. Derby's, Mr. Brooks', Dr. Jackson's, or at my place.

'JOHN LOWELL.'

The following is extracted from a notice of Mr. Derby of the cultivation and uses of the buckthorn, referred to above by Mr. Lowell. 'You will perceive that Miller represents it as a shrub growing about twelve or fourteen feet high. The tree from which my plants were raised formerly stood in the garden of the venerable Dr. Holyoke of this place, who used the berries for medicinal purposes, and was as large as any of our common apple-trees. He assures me he was induced at last to cut it down, as it shaded so much of his garden. I was so pleased with the healthy and clean appearance of the tree, and the next spring observing several young plants in the adjoining garden belonging to my brother, raised from seed dropped in the autumn, that I was induced to transplant them to a nursery, where they grew with great rapidity.

'After trying several kinds of trees for the purpose of making a hedge without much success, I was induced to try this, which has afforded a most beautiful fence, so much so as to attract the attention of every person who has seen it. It divides my garden, is about three hundred feet in length, the plants set nearly a foot apart, is five feet high, and two feet wide at top, which is cut nearly level. It shoots early in the spring, makes a handsome appearance, and continues its verdure till very late in the fall. It has not so much spine as either the English or American hawthorn, but I think sufficient to protect it from cattle. The plant bears the knife or shears remarkably, and makes as close and tight a fence as either of the others, and is not subject to blight, as both of them have been with me. You will observe that Miller speaks of it as not so proper for hedges as the hawthorn or crab, which may be the case in England, but I cannot agree with him as it respects America.'

The tree furnishes a large quantity of seed, which rapidly vegetates; and I make no doubt it can be propagated by cuttings, which mode I shall adopt in the spring.

We are apprehensive that no species of thorn can be cultivated to advantage in New England for the purpose of making hedges, on account principally of the insects which in this part of the country infest that plant. Some, however, prefer the American thorn, (*cratægus cordata.*) A valuable communication relative to the use of this and other plants for live fences, by Benjamin Shurtleff, M. D., may be found in New England Farmer, vol. ix. p. 209.

Upon consulting Mr. Lowell as to any changes it would be proper to make on the article of hedges, he states that he still gives the preference to the buckthorn, but that the Newcastle thorn, grown by John Prince, Esq., is more beautiful, and it bids fair to be as enduring and as free from disease. The rapidity of growth of the buckthorn is in his judgment a full equivalent for the beauty of the other.

SHEEP. There are a great many varieties of sheep, with differences more or less marked. To give even an abridged account of all the kinds described in foreign publications would require a large volume. In England the principal division of sheep is into the long wool and the short wool kinds. Among those bearing long wool are the *Leices-*

ter, *Devonshire Nots*, *Exmoor*, *Heath*, the *Bakewell* or *Dishley* breeds, &c. &c. The origin of the last-mentioned breed of sheep is thus described by an English writer:

'Mr. Bakewell selected from his own flock, and from the flocks of others, those sheep to breed from which possessed in the greatest degree that perfection of form he was desirous to retain and perpetuate. By judiciously crossing them, and selecting the most perfect of their progeny, he at length succeeded in forming the breed, which has been distinguished by the name of the New Leicester, or Dishley breed; and having attained his object, he carefully guarded against any future intermixtures with other breeds. This breed exceeds all others in its propensity to fatten; and by crossing by rams with this breed, a considerable portion of the long-wooled sheep in England have been greatly improved in this respect.

'The peculiar characters of these sheep have been well described by Mr. Culley, an eminent grazier in Northumberland, who introduced the breed into that part of England. The Dishley breed are distinguished from other long-wooled breeds by their fine lively eyes, clean heads, straight, broad, flat backs, round (barrel-like) bodies, very fine small bones, thin pelts, and inclination to fat at an early age. The last property is probably owing to the before-specified qualities, which, from observation and experience, there is reason to believe extend generally through every species of domestic quadrupeds. The Dishley breed is not only peculiar for the mutton being fat, but also for the fineness of the grain; the flavor is superior to the mutton of most other long-wooled breeds. The weight of the carcass may be stated in general: ewes three or four years old, from eighteen to twenty-six pounds per quarter; wethers two years old, from twenty to thirty pounds.'

Among the *short-wooled* sheep, the English possess, besides the Merino breed, *South Downs*, the *Ryeland*, the *Shropshire*, the *Shetland*, the *Dorset*, *Wilts*, &c. &c. Merino sheep were first introduced into Great Britain in the year 1787; and although it was formerly a general opinion, that the excellence of their fleece depended in a great degree upon the temperature of the Spanish climate, it has been ascertained that the fineness of the Spanish wool is not impaired by breeding the sheep in England, France, Saxony, Hungary, &c.

It is important in the management of sheep to keep the store sheep in as equal condition as possible, but not too fat, all the year round. In the grass season they should be kept in dry pastures, in which the grass is short and sweet. During the winter they should have a steady and measured allowance of suitable food, and not sometimes be fed profusely, and at other times scantily.

Mortimer says, 'The farmer should always buy his sheep from a worse land than his own, and they should be big boned, and have a long greasy wool.

'For the choice of sheep to breed, the ram must be young, and his skin of the same color with his wool; for the lambs will be of the same color with his skin. Those ewes which have no horns are found to be the best breeders.'

The farmers of Europe know how to distinguish the age of sheep by their teeth. When a sheep is one shear, as they express it, that is, has been sheared but once, or is in its second year, it has two broad teeth before; when it is two shear, it will have four; when three, six; when four shear, or in its fifth year, it will have eight teeth before. After this, their mouths begin to break.

'The fat pastures breed straight, tall sheep, and the barren hills square and short ones. But the best sheep of all are those bred upon new ploughed land, the reason of which may be easily guessed, as such land is commonly the most free from bad grasses.

'All wet and moist lands are bad for sheep, especially such as are subject to be overflowed, and to have sand and dirt left on them. The salt marshes are an exception from this general rule; for their saltness makes amends for their moisture; any thing salt, by reason of its drying qualities, being of great advantage to sheep. The best time for sheep to yean, which go twenty weeks with lamb, is in April, unless the owner has any forward grass, or turnips. Ewes that are big should be kept but bare; for it is dangerous for them to be fat at the time of their bringing forth their young. They may be well fed, indeed, like cows, a fortnight beforehand, to put them in heart.'

M. Buffon says, 'One ram will be sufficient for twenty-five or thirty ewes; but that he should be remarkable for strength and comeliness; that those which have no horns are very indifferent; that the head of a ram should be large and thick, the forehead broad, the eyes large and black, the nose short, the neck thick, the body long, the back and rump broad, the testicles large, and the tail long; that the best are white, with a large quantity of wool on the belly, tail, head and ears, down to the eyes; that the best sheep for propagation are those which have most wool, and that close, long, silky and white; especially if at the same time they have a large body, a thick neck, and are light footed.'

He says, 'that ewes fatten very fast during their pregnancy; that as they often hurt themselves, and frequently miscarry, so they sometimes become barren; and that it is not very extraordinary for them to bring forth monstrous productions. But when properly tended, they are capable of yeaning during the whole of their life, or to the age of ten or twelve years. But most commonly when they come to be seven or eight year old, they begin to break, and become sickly; and that a ram is no longer fit for propagation after eight years, at which time he should be fattened with the old sheep.'

According to the same writer, 'sheep should in the summer be turned out early in the morning to feed; and in four or five hours, after watering, be brought back to the fold, or to some shady place. At four o'clock, in the afternoon, they should be turned to their pasture again, and continue there till evening; and were it not for the danger of wolves, they should pass the night in the open air, which would render them more vigorous, clean, and healthy. As the too great heat of the sun is hurtful to them, shady pastures are best for them; or else to drive them to a place with a western descent in the morning, and the contrary towards evening.' That their wool may be saved, they should not be pastured in bushy places, or where there are briars. Sheep are often thus deprived of most of their fleeces; which, besides the loss of the wool, is very hurtful to the animals, when the weather is not warm.

The above writer directs, 'that every year a flock of sheep should be examined, in order to find out such as begin to grow old, and ought to be turned off for fattening. As they require a particular management, so they should be put in a flock by themselves. They should feed while the grass is moistened with dew in the morning. Salt should be given them to excite thirst, as the more they drink the faster they will grow fat.* But to complete their fattening, and make their flesh firm and solid, they should have some corn or grain

* It has been found, however, that salt given in excess is injurious to sheep.

given them.' They may be fattened in the winter; but it is commonly too expensive, as they will require a good deal of richer food than hay. When sheep are once become fat, they should be killed; for it is said they cannot be made fat a second time. The teeth of ewes begin to decay at five, those of weathers at seven, and those of rams not until eight.

Ewes, Lambs, &c. It is recommended to give ewes with lamb a somewhat more than ordinary quantity of food for a month or six weeks before they are expected to yean; not enough, however, to make them fat, as dangerous consequences might attend their being in very high condition at that period. Turnips are said to be injurious to ewes with lamb, but may be well given them after they have yeaned. If your sheep, whether store sheep or ewes with lamb, have good hay, about a quart of potatoes a day to each will, it is said, be very beneficial, and an ample allowance. But when the object is to fat them, according to a writer in Rees' Cyclopedia, about a gallon of potatoes a day, with a little hay, will be the proper quantity; but this is dependent, in part, on the size of the animals, and in part on the quality and quantity of the hay which is allowed to them. Potatoes, besides their use as *food* for sheep, are said to be very serviceable as an article of diet, which usually supersedes the necessity of *medicine.* They have, when given raw, an opening or purgative quality, which is thought to be of use, and answer a similar purpose with sheep which is effected with swine by brimstone and antimony. Potatoes, baked, steamed, or boiled, will furnish more nutriment than those which are raw.

Care should be taken to place in the stable small tubs or troughs of water for the sheep to drink in. They will do very well in summer without water, as they feed when the dew is on, but they need water in winter, especially if fed mostly on dry food. 'When sheep have colds, and discharge mucus from the nose, good feeding, together with pine boughs, given occasionally, will cure them; or tar, spread over a board, over which a little fine salt is strewed, will induce the sheep to lick up tar, and this will cure a cold.'* Half a gill of Indian corn a day, given to each sheep during winter, is recommended as keeping them in good heart, preventing the wool from falling off, and enabling the ewes to rear their

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* Deane's New England Farmer.

young better than they would if fed altogether on food of a less substantial nature.

'When several kinds of food can be procured, it is right to give them alternately to the sheep at different meals, in the course of the same day; the qualities of one kind aid or compensate those of another. At certain hours of the day, dry fodder should be given, and, at others, roots or grain. If there be any danger that the roots may decay, the winter should be begun with them, mixing, however, some dry food with them, for alone they would not be sufficiently nutritious.'*

Writers do not agree on the quantity of food which a given number of sheep will consume to advantage in a given time. Probably, it would be very difficult to lay down any rules on the subject which would not be subject to very nearly as many exceptions as coincidences. Some seasons would require more food than others for the same sheep; the same number of sheep of different sizes, ages, sexes, and breeds, would also consume different quantities of food of the same quality. When we add to these causes of error the consideration that food of the same kind is often very different in quality,—one ton of clover hay, for example, mowed at the right period of its growth, and well made and housed, may be worth two tons of the same sort of hay grown and made under different circumstances—nothing, therefore, can be hoped for in this inquiry, except some approximation to truth. We may, however, perhaps provide ourselves with materials for the exercise of those qualities for *guessing*, for which New England people are celebrated. When a man is laying in fodder for his sheep or neat cattle, it may be of great consequence to be able to form a conjecture approximating the truth, relative to the quantity and quality of provisions for that purpose which it may be expedient to accumulate.

Mr. Lawrence says, 'sheep will eat, on an average, twenty pounds of turnips each in twenty-four hours. An acre of good turnips in the field, between November and March, will keep one hundred sheep six weeks. One gallon of raw potatoes will suffice a sheep twenty-four hours, but some will eat much more. Fourteen hundred sheep will eat up and spoil an acre of good turnips in a night. Of the quantities of hay and corn [grain] which a sheep will consume

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* Tessier's Treatise on Sheep.

daily, I do not recollect any accurate experiments. To feed liberally one hundred sheep with this precious article throughout the winter season, ten tons at least would be required; although I have lately been informed by a great sheep-master, that he allows but that quantity to a flock of one thousand; his turnips being exellent, with plenty of grazing ground.

'As to corn, [grain] a large sheep will eat several pints or pounds per day; and the comparison of quantity of food between the sheep and the ox may be generally stated at one-eighth or one-ninth part for the sheep.'

'One thing (says M. Tessier) cannot be too much recommended, which is to place the hay in the racks while the sheep are out of the house; by this precaution, the dust will not fall upon the fleeces.' Dr. Deane observed that the rack in which the hay is put should be upright, so that in feeding the seeds, chaff, &c. should not fall into the wool about their necks. Under the rack should be a trough for catching the seeds of the hay and feeding the sheep.

With regard to giving salt to sheep, writers have disagreed. It is believed to be better not to give them any than to allow them too great a quantity. M. Tessier says, 'Sheep have been known to be attacked by long and troublesome looseness in consequence of having taken too much salt; which has induced the belief that sea-water is poisonous to them; and that his sheep have always been healthy, though he had never given them any salt. But he states that it may be indispensably necessary in wet countries. And Dr. Cooper, editor of the last edition of the Domestic Encyclopedia. recommends one-fourth of an ounce a day as a proper quantity for sheep. Mr. Grove likewise says, 'salt is required by sheep at intervals during the whole year, but it is often given in too great quantity, and almost forced upon the sheep; which is often injurious, and often injures the digestion so that the best grain will pass through them unaltered.'

The same writer says, 'In the season for dropping lambs, the utmost care is necessary. The birth is most commonly easy, but often slow. Ignorant shepherds are very apt on such occasions to be aiding in the birth, which is always useless and often very injurious.

'It often happens,' says Mr. Grove, 'that ewes will not own their lambs, particularly the first they bear; and in this case I would advise to the sprinkling a little salt on the lamb, which induces the ewe to lick it, after which she will generally allow it to suck. If not, the ewe with her lamb should be placed in a separate inclosure (of which several should be previously prepared) and fed with the most nutritious fodder, particularly with nourishing liquids, that the udder may be uncomfortably distended; and if this be not sufficient, she must be tied by the legs till the lamb has been once suckled; after which there will be no farther difficulty.'

Sir John Sinclair observed, that 'there is no food of which sheep are fonder than pea-straw; and where circumstances are favorable for that crop, peas ought to be cultivated more for the straw, from the advantages that would thence be derived by the sheep-farmer.' Mr. Young also observes, that 'the straw of early white peas, applied to sheep, is the most valuable return made by straw.'

A writer for the New England Farmer, vol. iv. p. 234, with the signature M. R. C., gives the following judicious remarks on sheep.

'Perhaps there is no domestic animal that requires more nice and constant attention than the sheep, and no other that will more richly pay for generous keeping. Though he may not be more liable to disease, nor require a better quality of food than neat stock, still that management which will keep cattle in good case will not answer for sheep. His habits and mode of feeding are entirely different. For instance, in the winter season a cow may be kept tied to the stall twenty-two hours out of the twenty-four, and, if well fed three times a day, keep her flesh and get sufficient exercise for her health. Serve a sheep in the same manner and it would not probably live a month. It is natural for sheep to move about and change situation. Turn a flock of hungry sheep into a pasture, they will run to the end of it before they begin to eat; feed them in troughs, they will run over all till they come to the last, when they have it in their power. They are almost continually shifting situation from hill to dale, from one kind of food to another; and it is a fact that sheep will thrive better on two or three different kinds of ordinary fodder, than they will to be confined to one kind that is of a superior quality.

'The proper time to yard sheep in the fall is while they are yet in good order from fresh feed, and before the frost takes the nourishing qualities from the grass: but a time in which many sheep are not folded; they are left to nibble over the frozen pastures till they lose the flesh of half a summer's keeping, and which takes half a winter to regain. It is a great error which is persisted in with an idea to save fodder. But setting aside the injury done pastures by close feeding at this season of the year, the sheep which stray away and are lost, and the time spent in hunting them, which are not idle considerations, the farmer would more than get repaid for his extra fodder, and a few weeks' attention in yarding his sheep sooner, by preserving their health and condition. When they are put to winter quarters they require as much variety as possible, not that they want so much room, but they need a number of different apartments. Two yards and one shed will do very well for one flock, or, what will answer the same purpose, if a large number of sheep are to be kept near each other, have the yards in a row, and one more yard than flocks of sheep. Then by shifting one flock to the spare yard it leaves another vacant, and so on. Thus may all be changed, which should be done at every time of feeding. As fast as the yards are empty, the food should be put in them, and never while the sheep are there. One hundred sheep are enough to be kept together. Cleanliness is of the utmost importance. Their yards should be littered with straw or something of the kind constantly, or they will be in danger of losing in a degree a relish for their food.

'The next thing necessary is to have proper places for your sheep to eat hay in, which are the common board mangers, and may make partings to the yards. Take six joists, say three inches square, and four feet long; have the boards of a length, then nail two of them to the joists set up perpendicularly in such a manner that one joist will be in the middle of each board, and the other two at the ends, and that the top edge of the boards will be one foot from the ground; then nail short boards on the ends two feet and a half long, the width of the manger; the next board on the sides to be placed eight inches from the lower boards, then board it tight to the top of the joists, and the manger is finished. A manger eighteen feet long, of this description, will accommodate thirty sheep. Single mangers may be made along the outside fence of the yard, which do not require to be so wide. The great superiority of these mangers over racks is, first, the facility of putting hay into them without dropping it on the ground; secondly, it obviates the danger of hay-seed falling on the wool of the sheep; and thirdly, it prevents any waste of fodder. The next thing after mangers for hay, should be a place appropriated for feeding out roots, which every farmer should raise to a certain extent. Although we cannot turn them to so good an account as the English feeders do, on account of the severity of our winters, still a proportion of them as food for our stock is of great importance. In order that the farmer may make the most of his roots, he should have a cellar fixed to receive them in the fall, without too much labor, and accessible at any time in the winter, without endangering them by frost. The cellar should be placed as near the yard as practicable, with a watering-place at hand. A good way of washing roots is to have an oblong box that will hold two or three bushels, with the bottom perforated with auger holes, and rockers placed on the under side of the box; then by pouring in a little water and rocking them, the dirt will directly wash through the bottom of the box. They should then be cut fine with a sharp shovel, and they are fit for feeding out. Browse in the winter occasionally for sheep is very palatable, and is of considerable use in preserving their appetite, and as a change of food, but care should be taken to select the right kind. There are many kinds of hard wood, of which the bark and buds are very injurious.* The bark of the black cherry eaten by ewes with lamb is almost sure to produce abortion. Generally winter green is to be preferred to any other browse. White and yellow pine are best.

'Regularity in feeding sheep is of prime consequence in cold dry weather. It is not necessary to feed them oftener than three times a day, if discretion is used in the quantity of fodder. In warm weather, and especially if it is muddy, they should have little at a time, and be fed four or five times a day. Daubenton and others calculate that two pounds of hay are sufficient for the support of one sheep a day, (which, by the way, in our climate is not enough.) Calculations of this kind, if made with the utmost accuracy on one, or any number of sheep at one time, will not apply to the same sheep at another; because so much depends on circumstances. A sheep that will eat three pounds of hay in a cold day will not, perhaps, eat more than two in a warm day following; and still less in a damp one. Not that they require so much more food in cold weather than in warm,

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* The wood disease, so much complained of in France, is wholly owing to sheep's eating fresh buds.

but that sudden changes affect their appetites and without injuring their health. Again, a sheep of proper form and inclination to fatten will not need so much nutriment to preserve its flesh as one of the same weight of a coarse, rawboned, uneasy make. And one kind of hay may have double the substantial qualities of another. Therefore no certain rule can be given as to the quantity necessary for their support; though experiments of this kind are not without their use, for, as remarked in one of the New England Farmers, they afford " a fine opportunity of guessing at the proper quantity necessary to keep a stock a given time."

'There exists a great diversity of opinion in regard to the proper time of year for lambs to come. A New York writer thinks that rams should not be taken from the ewes at all; that lambs should come early in the winter, which is the natural time. This I think erroneous; the natural time is the most convenient time, and the proprietor should be governed wholly by his means. There are advantages in having lambs come early, and disadvantages, and *vice versa* the same in having them come late. If a man has conveniences for guarding against cold, and plenty of succulent food for his ewes, February and March is decidedly the best time for them to come. It is true that they require more attention at this season than in warm weather, but time is not worth so much, and the lambs learn to eat hay before they are turned to pasture, consequently they do much better the following winter. They get out of the way of foxes, and are able to take care of themselves at washing and shearing time, which is of considerable consequence. On the contrary, if the farmer is deficient in proper food and other conveniences for his sheep, and has a pasture near that he can look to his flock, it may often be advisable to have his lambs come in April or May.

'When sheep are turned to pasture in the spring, the transition from dry food to grass causes a relax, which spoils, or very much injures a great part of the wool on their buttocks and thighs, and makes double the work at the time of washing; therefore, before they are turned to pasture the wool in the way should be carefully shorn off, which is very little trouble, and makes a saving worth noticing.

'In selecting a flock of sheep, the first care undoubtedly should be to get those of the evenest and finest wool; the next, those of the best form and most peaceable disposition; and the next care, which is very little thought of, to get those that are without horns. Any one who has had the management of sheep in the winter can testify to the injury which large-horned sheep do in crowding after fodder and running through gates, &c. Horned rams kept with pregnant ewes do great mischief. In many parts of Spain they amputate the horns of their rams, for which there are various processes: some use a large chisel; others a saw, which is the most expeditious way, and is preferable. There are other serious objections to the keeping of horned sheep, which I cannot better exemplify than by quoting the following words from Henry Cline, an eminent surgeon.

'"Horns are useless in domestic animals. It is not difficult to breed animals without them. The breeders of horned cattle and horned sheep sustain a loss more extensive than they may conceive, for it is not the horn alone, but also much more bone in the skulls of such animals to support their horns; besides, there is an additional quantity of ligament and bone in the neck, which is of small value. The skull of a ram with its horns weighed five times more than another skull which was hornless. Both these skulls were taken from sheep of the same age, each being four years old. The great difference in weight depended chiefly on the horns, for the lower jaws were nearly equal, one weighing seven ounces and the other six ounces and three-quarters; which proves that the natural size of the head was nearly the same in both, independent of the horns and the thickness of the bone which supports them. In a horned animal the skull is extremely thick, in a hornless animal it is much thinner, especially in that part where the horns usually grow."

'To those who have not reflected on the subject, it may appear of little consequence whether sheep or cattle have horns; but, on a very moderate calculation, it will be found that the loss in farming stock, and also in the diminution of animal food, is very considerable from the production of horns and their appendages. A mode of breeding which would prevent the production of these, would afford a considerable profit in an increase of meat and wool and other valuable parts.'

Shearing Sheep, &c. Deane's New England Farmer states, that 'we shear our sheep in general too early in this country. In England, where the spring is more forward than in this country, the approved time of shearing is from the middle to the latter end of June. They should be washed in a warm time; after this they should run three or four days in a clean pasture, before they are shorn. It is good for them to have time to sweat a little in their wool, after washing.'

Mr. Lawrence says, 'June seems [in England] to be the general shearing month, and where no extraordinary precautions are taken, the business had better be delayed till towards midsummer, more especially in cold backward springs; because in such seasons we seldom until that period have any settled fair weather. Besides, a more perfect fleece is obtained, and fuller of yolk from the perspiration of the animal.

'Washing previous to clipping the sheep is the general custom, with few exceptions, in this country; indeed it is proper with all long-wooled sheep, but not so easily practicable with the matted, greasy, and impenetrable fleeces of the Spanish and carding-wool breed, which in Spain they invariably shear dry, as has been the practice in Devonshire, with the short-wooled sheep, for centuries.'

It is observed by Loudon, that 'sheep shearing in Romney Marsh, [England] commences about midsummer and finishes about the middle of July. Those who shear latest apprehend that they gain half a pound weight in every fleece, by the increased perspiration of the sheep and consequent growth of the wool. Besides, they say, in early shearing the wool has not the condition which it afterwards acquires. But then in late shearing the fleece will have the less time to grow, so as to protect the animal against the rigors of the succeeding winter; and if a year's interval is allowed between each clipping time, after your routine is established the wool will have had the same period for its growth, whether you shear early or late. Sheep with fine fleeces, which are shorn without being washed on the back of the animal, may be clipped earlier in the season than those which are exposed to suffer for half an hour or more in cold water.'

Lemuel W. Briggs, Esq., of Bristol, Rhode Island, in articles published in the New England Farmer, volume iii. pages 273, 287, stated certain facts, which would seem favorable to early shearing; and in certain circumstances, and particularly with sheep which are not washed, there can be no doubt but the practice is beneficial. Mr. Briggs stated in substance, that Mr. Rouse Potter, of Prudence island, Narraganset bay, Rhode Island, who kept nine hundred and fifty sheep, and lost but two the preceding winter, begins to shear them by the first of May if the weather is favorable, and continues daily until he completes his shearing. For the first week, he puts those sheared under cover or in close yards every night; by that time the wool will grow so as to give them a sufficient covering. By this practice of early shearing he gains much wool, which formerly, when he put his shearing off till the middle of June, the sheep would shed; and farther, when thus early sheared, the wool begins to start and grow much quicker than when shearing is deferred to the usual time. He says, that formerly, being exposed immediately after shearing to the rays of the sun, their bare backs would frequently become sore and scabby, when no wool will grow till healed, and then what does grow from these scars is thinner and coarser than the rest.

'Mr. Potter states, that he has found from actual experiment, that he not only gets more wool, which would otherwise be lost, but the *succeeding wool* will be from half an inch to an inch longer, if sheared early, than it will be if delayed to the usual time of shearing. And farther, there is not the same necessity for washing the sheep, as the wool is much cleaner, more free from sand and dirt, when taken off early, than it would be if suffered to remain on their backs until a hot sun had compelled them to seek refuge under walls and fences.'

The foregoing authorities are apparently altogether contradictory, as respects the time of year in which to shear sheep. But it is to be observed, that Mr. Potter did not wash his sheep before shearing, which must make considerable difference with regard to the risk from cold; and Mr. Potter appears to have been careful to shelter his sheep after shearing, which must in a great measure obviate the disadvantages of early shearing.

Mr. Lawrence, an eminent English writer, asserts, 'It has frequently appeared to me, on reflection, that it might be preferable to shear all kinds of sheep unwashed, and to wash them after shearing, when it would be much more effectual with respect to their health. Such as were affected with foulness or eruption of the skin might be washed and scrubbed in a lye of water and wood ashes, in a large tub which would contain three. It would both conduce to the health of the sheep and promote the regular growth of the wool. Wool would probably keep best in the grease, and dust might be shaken from it. Any difficulty in respect to fixing the price of wool in an unwashed state would vanish in a season or two.'

'Clipping off the coarse soiled wool about the thighs and docks,' says Loudon, 'some weeks before the usual time of washing and clipping the sheep, is an excellent practice, as by this means the sheep are kept clean and cool when the season is hot; and with ewes, the udders are prevented from becoming sore.'

In separating for the purpose of washing, the flock is brought to the side of the washing pool, and those lambs and sheep of different kinds fit to be washed are put into separate inclosures; and such lambs as are too young to be clipped are not washed, but confined in a fold or inclosure of any kind, at such a distance from the washing place that they may not disturb their mothers by bleating.

In performing the operation of washing, it was formerly the method to have the washers standing up to their breast in the water; but from the inconvenience and danger of it, (the men requiring a large supply of spirituous liquors, and being liable to be attacked with colds, rheumatisms, and other diseases,) various other modes of performing the operation have been proposed. Among others, that of sinking an empty hogshead or other vessel of sufficient capacity for a man to stand in while washing the sheep, may be as eligible as any. A boat near a bold shore of a sheet of water, with one end aground, by which the sheep is introduced and put overboard, while the man who washes him remains in the boat and extends his arms over the sides, and thus performs the necessary manipulations, furnishes a convenient mode of washing sheep. A small perpendicular waterfall, under which sheep are conducted, may likewise be used to advantage for that purpose.

It was uniformly the practice, immediately after shearing, to smear the bodies of sheep with some ointment, in which tar is the chief ingredient. This, however, has been condemned, as causing a waste of wool in carding and manufacturing into cloth. But if the tar is mixed with a sufficient quantity of some greasy substance, the benefit may be obtained, (which is to preserve against ticks and the scab, as well as to increase the growth of the wool,) without any bad consequence resulting. A writer in Rees' Cyclopedia, on wool, says much in favor of a composition greatly used in Northumberland, England, and gives the following directions for making it: 'From sixteen to twenty pounds of butter are placed over a gentle fire and melted: a gallon of tar is then added, and the mixture is then stirred with a stick until the tar and butter are well combined, and form a soft tenacious ointment.' Some skill is required in its application. The locks should be divided, and the ointment applied directly to the skin. It does no good to apply it to the outside of the wool, but it must come in contact with the skin. This is best effected by opening the wool along the neck and back, and applying the ointment with the finger. In short, you must apply it in such a manner that it will be most likely to spread over every part of the body. The quantity laid on each animal differs in different districts. In the lighter mode of greasing, one gallon of tar and twenty pounds of butter will be sufficient for fifty sheep. In Scotland, where greasing is applied merely to preserve the animal from inclemency of the climate, a much larger proportion of tar is used. This would be very injurious to the wool were it any other but the coarsest kind. To derive the greatest advantage from the ointment, both to the wool and the sheep, it should be applied immediately after shearing, and again on the approach of winter. By the first greasing, the wool will be kept soft and moist during the sultry heats of July and August, and the top of the staple will not become harsh and discolored. One acknowledged advantage of greasing immediately after shearing should not be overlooked: it destroys the sheep tick, and has a tendency to prevent cutaneous distempers, and to protect the skin against the bite of the fly.

Mr. J. Nelson published a recipe for the scab on sheep, similar to the above, but which we should suppose might answer a still better purpose; it is as follows: 'Take three gallons of tar and three gallons of train oil, boiled together, to which add three pounds of roll brimstone finely powdered and stirred in.' This quantity is sufficient for ninety sheep. It is poured on with a pitcher or ladle from the top of the back-bone to the tail.

When the object is solely the destruction of ticks, a strong decoction of tobacco is probably as good an application as can be prescribed. Lambs often suffer much from ticks, after the sheep are sheared; as the ticks which are driven from the old sheep take refuge with the lambs. It will, therefore, be advisable to apply either the ointment or the tobacco decoction to the lambs as well as to their elders. And in all cases see that your application goes to and spreads over the skin as equally as possible, instead of wetting or smearing the outside surface of the fleece, where it will be of more harm than benefit.

On the Disorders of Sheep. The following observations are extracted from an *Essay on Sheep*, written by H. D. Grove, a scientific shepherd, who has been acquainted with *sheep husbandry*, as practised by the *wool growers* of *Saxony*, France, and other parts of Europe.

Almost all the disorders which attack sheep are caused by the want, and seldom or never by the excess of activity in the vital organs. The nerves are very susceptible, but seldom act with great force, and whenever they are powerfully excited, this excitement soon passes off and leaves the animal extremely weak. It follows from this that most of the means required for the cure of diseases among sheep should be calculated rather to excite than to allay the activity of the functions of life. A few of the most common diseases among sheep deserve to be particularly noticed.

The Rot exhibits itself scarcely at all externally. The blood loses its high color and tendency to coagulate, and becomes watery. The first perceptible symptom therefore is the loss of the bright red appearance about the eyes; the lips and inside of the mouth also become pale, as well as the skin generally under the wool. The animal continues to feed well and does not grow poor, although the natural vivacity is diminished and some signs of weakness occur.

The disease commonly gains strength in the winter. Watery swellings are formed, particularly under the chin, which are often absorbed and then reappear. Soon after these the animal generally dies, without showing any symptoms of violent pain. Ewes attacked by this disease die most commonly about the time of dropping their lambs. The body on opening exhibits copious collections of water about the chest and entrails; the blood is extremely pale as well as the flesh. This disorder is unquestionably caused by feeding in swampy grounds, and a few hours are sufficient to fix it upon a sheep. It is increased by damp, foggy weather, while, on the other hand, dry warm weather and high pasture, especially where there are many aromatic herbs, are sometimes sufficient to counteract the first symptoms and effect a cure. This disorder, however, when it has reached such a point that a common observer may notice the symptoms, is probably incurable. At a very early stage a cure is possible if the flock is kept carefully on high land where aromatic herbs are abundant, and particularly among juniper bushes, and in bad weather carefully housed and well fed. Horse-chestnuts are an excellent article for fodder in this case; also a mixture of juniper berries, wormwood, sage, gentian, angelica roots, willow bark and other bitter herbs, with a little salt and grain, which they will eat of their own accord, or if not, it should be administered in small quantities in the morning before they are driven to pasture. If the rot makes its appearance in a decided manner before the winter sets in, it is useless to attempt any thing more than to fatten the animal as soon as may be and sell him to the butcher. The rot certainly is not infectious, and it very often occurs that only a few sheep are attacked in large flocks; and generally in such cases, if the shepherd is honest, the disease may be traced in every case to some swamp or other wet place, where these particular sheep may have strayed.

The Mouth and Hoof Distemper. These complaints seem to have a mutual connexion, since the former, which is the mildest, very often precedes the latter. In the mouth the principal evil to be feared is that the sheep become emaciated from the inability to eat. The best remedy is to bathe the parts affected with a strong decoction of sage, mixed with an equal quantity of vinegar and a little honey. If the blisters continue to spread, half an ounce of blue vitriol should be added to a quart of this mixture. The disorder in the hoofs is soon discovered by lameness, and if this is evidently not produced by any external injury, and especially if several sheep in a flock are attacked at the same time, great care should be taken to obviate the effects of this disorder. The best remedy is a poultice of dough or fat loamy clay, which should be applied to the foot by means of a little bag, but not tied hard to the ankle, and kept constantly wet with vinegar, till a swelling appears on the upper side of the foot or in the cleft of the hoof. This should then be opened with a sharp knife and the dead hoof pared off. The wound must be washed with cold water and sprinkled with dry vitriol. The lame animals should remain carefully separated from the sound ones, and the washing and sprinkling with vitriol repeated till the cure is effected. This disease is not only contagious, but also infectious in the highest degree, and oftentimes so violent as to produce caries in the bone after the hoof is destroyed.

The Itch or Scab. This disorder is dreaded more than any other, and did in fact more damage in many districts than any other, until the proper mode of treatment was discovered. The scab is certainly contagious, and may readily be propagated by merely touching the skin of a healthy animal with matter from a pustule on another sheep; but as far as my observation has extended the infection is not conveyed through the atmosphere, though it often seems to be epidemic, and particularly in very damp summers, which affect sheep in many other ways so unfavorably.

It is discovered by the animal's constantly rubbing or scratching itself, and making at the same time a peculiar motion with the lips; the scabs are sometimes dry and sometimes moist, and spread very rapidly, though the animal continues healthy in other respects, and generally more lively than before. Afterwards, however, the disorder becomes internal, the sheep becomes emaciated, and dies from weakness and pain. If the scab is observed at an early period it may be easily cured, or at least prevented from spreading. One of the best remedies is a strong decoction of tobacco, to be applied to the diseased parts, after scratching off the scabs with a comb or other instrument. The decoction of tobacco mixed with lime-water and oil of vitriol, and used constantly for some time, will generally effect a radical cure; another excellent remedy is a decoction of hellebore mixed with vinegar, sulphur, and spirits of turpentine. Internal remedies are of no use except when the disorder has induced other complaints by weakening the general health.

The Sheep-Pox. This disorder is contagious and propagates itself by exhalation from the sick to the healthy animal, but it has not yet been discovered how far these exhalations may extend. If, however, it appears in a neighboring flock, care should be taken to mitigate its effects by a general and careful inoculation, since it is certain that the disorder is less violent if taken by inoculation than in the natural way. The operation is perfectly simple and easy. The animal is laid on its back and held by two or three men, while the operator introduces the matter, from a pustule five or six days old, in two or three places between the legs or on the tail. The lancet should be introduced in a slanting direction under the skin about an eighth of an inch, and when it is withdrawn, the skin should be pressed down upon it so as to wipe off the matter and leave it in the wound. A pustule is formed generally in four days, and reaches its greatest size on the sixth, when a few others generally appear near the first.

Soon after this the usual symptoms of fever and general eruption take place, which last is, however, more regular and safe than if the animal had taken the disease without inoculation.

The only care necessary during the progress of the disorder is to keep the sheep in a cool and airy situation. Internal remedies are not required, but the sores should be often washed with a strong infusion of camomile flowers, in which a little blue vitriol has been peviously dissolved, and afterwards dressed with a salve made of yolks of eggs and turpentine, mixed with a little powdered charcoal.

The Reeling Sickness is never infectious, but generally incurable. Its first symptoms are a weakness in the gait, and a disposition in the animal affected to remain separate from the flock. The head is thrown into an unnatural posture, generally on one side. The animal then begins to turn round, always in one direction; stumbles and falls repeatedly, sometimes with the head under the body, then ceases to feed, and soon dies.

Lambs and yearlings only are usually liable to this disorder, and very rarely sheep over two years old. The seat of the disorder is always to be discovered on the brain, where one or more blisters are formed and filled with a watery secretion.

The origin of this complaint, and of course the proper preventive treatment, remain as yet undiscovered. A cure is sometimes effected by an operation through the skull to let off the water.

The first step in this case is to examine the skull carefully in search of a soft spot in the bone, which usually indicates the spot affected. The skull is then perforated with a *trocar*, accompanied by a tube through which the water may escape; after which the tube also is withdrawn and a few drops of the essence of myrrh applied to the aperture. This operation is sometimes successful, but more often the reverse. If it succeeds, however, in only one cure out of five, it seems worth the trial, since without some relief the sheep must certainly perish.

Swelled Paunch. When sheep or other ruminating animals eat more than they can digest, the food ferments in the stomach, emitting great quantities of gas, which stretch this organ so as to draw together its apertures, the paunch becomes excessively distended, the lungs oppressed, the breath and pulse obstructed, and the death is very sudden.

This effect may be produced by fodder of any kind, but most readily by such as the sheep prefer, especially if they are not accustomed to it. Green clover and lucerne have, therefore, often been observed to bring on this disorder; but it is nevertheless certain that neither of these substances are in themselves injurious, since I have known sheep accustomed to them eat their fill day after day for months together without suffering any ill consequence. Any young green feed is more likely to be hurtful in this way than dry fodder, but only when eaten in excess after long abstinence. If the approach of the swelling is observed by the shepherd in season, it may be prevented by violent friction of the back and belly and driving the sheep rapidly. These remedies are assisted by a previous dose of lime-water, which should be repeated half an hour afterwards, taking care that the lime is good and not previously air-slacked.

If the attack is so violent as to leave no time for these remedies, an opening must be made in the paunch with the trocar and sheath; an operation which cannot easily be described, but may be exhibited without any difficulty to any person unacquainted with it.

I omit to notice a great variety of other diseases of sheep, which I have had no opportunity of attending to personally, and also the whole series of external injuries to which sheep are liable, and in the treatment of which each man's experience is his best guide.

A writer for the New York Farmer observes, 'I am told on credible authority, that a gentleman who was losing his sheep without apparent cause had occasion to use some clay about his house in the winter, and observed that his sickly flock ate it with avidity; he caused a load to be placed in their yard, much of which was devoured and his sheep speedily recovered.

As a cure, therefore, I would recommend clay to be placed in the sheep-yard, which can, at worst, do no harm, as the animals will not eat it unless prompted by instinct; or, when it is practicable, the boughs or branches of resinous trees, as the pine and hemlock, may be given to the flock in limited quantities. Roots of any edible kind will also be highly serviceable. As a preventive in future, I advise sheep-farmers to raise and lay in a good stock of ruta baga or other turnips, which are not only the healthiest but cheapest food for the winter consumption of sheep.

Worms in the head of Sheep. There exists in some parts of the country a species of fly, which naturalists call *œstrus ovis*, of the same genus with that which deposits eggs in the hair of horses, and causes bots. This fly attacks sheep, from about the middle of August to the middle of September, deposits its eggs in the nostrils of the animals, and causes those *worms* which so frequently destroy them. The Mechanic's Gazette recommends as a preventive, 'covering the nostrils of sheep with a list of gauzy substance, through which the animal can breathe, and keeping it in its place by some adhesive substance.' We doubt, however, the practicability of 'keeping it in its place' by any 'adhesive substance.' Another preventive which sheep owners tell us is effectual, is to keep the noses of the sheep constantly smirched with tar, from about the middle of August to the latter end of September. If the sheep swallow some of the tar, so much the better, as it prevents or cures the rot, and confirms their health.

If the fly has performed its mischievous function, and the seeds of the disorder are already sown, you may make use of the following:

'Take half a pound of good Scotch snuff, pour two quarts of boiling water on it, stir it and let it stand till cold; inject about a table-spoonful of this liquid and sediment up each nostril of the sheep with a syringe. This must be repeated three or four times at proper intervals, from the middle of October to the first of January; the grubs are then small and are much easier destroyed than afterwards, and have not injured the sheep, as they will if deferred until later. Half an ounce of assafœtida, pounded in a little water and added to the snuff, will make it more effectual. The owner of the sheep need not be alarmed, when the operation is performed, to see the sheep very drunk and apparently in the agonies of death, as they will in a few minutes recover. I never knew any bad effects to follow. Dry snuff may be blown up the nose with a quill, and have a good effect; but it is a tedious, dirty job. I have tried vinegar and blue die with but little or no success.'

Instead of 'Scotch snuff,' a decoction of tobacco will answer the purpose. A gentleman who owns a large flock of sheep, informs us that he had used it with perfect success. Spirits of turpentine have been injected into the nostrils of sheep, as a remedy for worms; but that substance appears to possess one material disadvantage, which should preclude its use for that purpose, viz. when thrown into the nostrils it kills the *sheep* as well as the worms.

Mr. Alexander Reed, of Washington, Pennsylvania, in an article on the management of sheep, published in the New England Farmer, vol. iii. p. 60, observed that daubing the sheep's nose with tar is considered as a protection against this enemy. What experience I have had is rather calculated to strengthen this opinion. I have always made free use of tar among my sheep, and I do not know that I ever lost one by the worms in the head.

It is said by some writers that if sheep are kept in good condition there is no danger of their suffering greatly from worms in the head; as they will be strong enough to expel the insects by sneezing. This may be, but still, the application of tar to the noses of the animals would prove serviceable by preventing their being teased by the fly, which causes great pain and distress at the time the nits are deposited, as well as eventuates in the disease of the sheep.

HORSE, one of the most useful of tame quadrupeds. The marks or evidences of a good one are these: a high neck, a full breast, a lively eye, a strong back, a stiff dock, full buttocks, ribs reaching near to the hips, well-made hoofs, rather large, and a good gait.

The size of a horse should be in proportion to the work in which he is chiefly to be employed. Small sized ones often prove good in the saddle. They are apt to be hardy, and in proportion to their size, and the quantity of their eating, usually are the most profitable. Plough horses, and all draught horses, should be large, as their weight is of importance in drawing; as it is often inconvenient to put two horses to one plough, especially in horse hoeing. Largeness is also of importance, when they are used single, in journeying, as they most usually are, in a chaise or sleigh.

A horse's manner of going is a matter of no small importance. The ambling gait, or what in this country is vulgarly called pacing, is not good, neither for the horse nor the rider. It is tiresome to both. It habituates a horse to carry his feet too near to the ground, so that he is the more liable to trip and stumble.

The method so much practised formerly in this country, of teaching horses to pace swiftly, and racing in that gait, is highly pernicious. It puts them to a much greater strain than running; and numbers have been thus ruined. Some colts naturally amble, and others trot. But all may be made to trot, if due care and pains be taken with them while they are young, or as soon as they are first ridden. In a carriage an amble is tiresome to a horse, appears highly improper, and is disgusting to every one; and I do not see why it should appear at all more tolerable in the saddle.

When any change of gait is wanted for the ease of the rider, the canter is to be preferred, than which none can be more easy.

The way of breaking a young horse that is mostly used in this country is highly absurd, hurtful, and dangerous. He is mounted and ridden before he has been used to the bridle or to bearing any weight on his back. If he will not go forward, he is most unmercifully beaten; by which his spirits are broken and his strength impaired. If he rears up, he is pulled backwards, with the risk of hurting both horse and man. If he runs and starts, as he probably will under such management, he flings the rider, perhaps is frightened, gains his liberty, and is encouraged to do just so the next opportunity; and the unfortunate rider blesses himself, as he has reason to do, if he escapes without broken limbs. Or if the horse should chance to go kindly, the rider continues the exercise till the horse is fatigued, discouraged, and injured.

Instead of this mad management, the way practised in the older countries should be adopted. Let a horse first of all be tamed with the bridle, by leading him again and again; in the first place, after or by the side of another horse; and after he walks well, bring him to trot after his leader. In the next place, put on the saddle, and lead him in that, time after time. Then lay a small weight on the saddle, and if he be apt to start, fasten it, that it may not be flung off; increasing the weight from time to time, till he learns to carry what is equal to a man's weight. Lastly, let a man gently mount him, while another holds him by the bridle, and fix himself firmly on the saddle. The place of riding is recommended to be a ploughed field. Let him thus be ridden with a horse going before him, till he learn the use of the bit, and will stop or go forward at the pleasure of the rider, and without the application of much force. Being exercised in this manner a few times, and treated with all possible gentleness, there will be no more occasion for leading him. He will go well of himself; and be thoroughly broken, without so much as giving him one blow, and without danger or fatigue to the horse or his rider. And, what is much to be regarded, the horse's spirits will be preserved, though he be sufficiently tamed. In teaching a horse to draw, gentleness must be used. He should be tried first in company with other horses, whether in carting or ploughing; and the draught should not be so heavy as to fret him or put him to great exertion till he has learned to draw steadily. After this he may be put to draw light loads by himself. Lastly he may be put to a pleasure carriage, but coupled with another rather than alone, and to a sleigh rather than a chaise.

It may be taken for a general rule, that the gait which is easiest to a horse will be the easiest to his rider; for jaded horses, it has always been observed, are apt to go hard, and to tire their riders.

The feeding of horses, as I conceive, has not been sufficiently attended to in this country; which is, doubtless, one reason why they are in general so mean and despicable. Too many keep horses who cannot well afford to feed them. They should neither run upon the roads and commons, nor in pastures that are filled with wild and water grasses. They love a dry pasture, not too much shaded, and short grasses of the best kinds. Clover and white honey-suckle, both green and dry, are excellent food for them. It nourishes them well, and prevents costiveness, which is very hurtful to them. The best of clover hay will keep them as well as most other kinds of hay with oats.

To fit a horse for a journey he should not be suffered to grow too fat and gross. He should for some time be kept in the stable rather than in the pasture, and fed mostly with hay and provender; but rather sparingly if he incline to be fat. He should have exercise daily, to harden his flesh and keep him in the habit of travelling. He should be shod some days before he begins a journey, that the shoes may be well settled to his feet, and the nails a little rusted at the points, that they may hold the faster. And the pads of the saddle should be well fitted to his back, so as to fill the hollows, and bear equally on every part. And while he is on the journey, he should be stabled every night. It is destructive to expose a horse to the dampness and cold of the night after severe exercise. But it would be best if neither horses nor any of our cattle were wholly confined to dry meat in winter. Horses indicate this by their eating snow with their hay. Set a basket of snow within reach of a horse, when he is at his manger, and he will take a mouthful from each alternately. Of all juicy food for horses in winter, writers on husbandry seem to give carrots the preference. They have been found by experience to answer well instead of oats for laboring horses; and to fatten those which are lean.

He that would be sure to keep his horse in good order must beware whom he suffers to ride him, and must see that he is never abused. Profuse sweating should always be avoided. And when a horse is much warmed by exercise he should not be exposed to cold air nor night dew, and much less to rain and snow. If he cannot be instantly rubbed down and housed when warm, he should be covered with a blanket; and he should always have a dry stable, and be well littered. The neglect of these precautions may bring on incurable disorders.

Horses should not be too much deprived of the liberty of motion, as they too often are. Close confinement after hard labor will be apt to abate their circulations too suddenly, make them chilly, and stiffen their joints. To be deprived of motion is bad for man and beast. Horses therefore should not be straitened for room in their stables. Stables should not be so low as to prevent their tossing up their heads as high as they please. Some stables have so little room over head as to bring horses into a habit of carrying their heads too low; they become afraid to lift them up. They should also have room in their stables to turn their heads to any part of their bodies, that they may defend themselves from the biting of insects, allay itching, &c. And their halters should always be so long, and their stable so wide, that they may lie down conveniently. Nor should horses be so placed as to be able to deprive each other of his fodder.

When horses are kept in stables, as they generally are in the coldest half of the year, they should be daily dressed, as it is called. The curry-comb and the brush should be well used on all parts of their skin which are covered with hair. This increases perspiration through the pores of the skin, which is necessary to health; and causes the blood to move faster in the veins. This treatment will not only cause them to look better, but they will have better health, and more activity and courage. They will digest their food better, and be better for service. But if rubbing and friction be wholly neglected, or slightly performed, the hair will appear dry and rough; the perspirable matter hardens in the pores of the skin, or remains lodged at the roots of the hair, and has the appearance of a dirty white dust, and sometimes like small scales, attended with itching. More especially is rubbing necessary for horses when they are growing cold after being sweated by labor. In such cases it should never be omitted.

Columella observes, 'that the bodies of cattle ought to be rubbed down daily, as well as the bodies of men; and says it often does them more good to have their backs well rubbed down, than their bellies well filled with provender.'

But in warm weather it would be best for them, that they should not have the confinement of the halter, nor even of the stable. A small spot of feeding ground, if it were only a few rods, adjoining to the stable, and the door left open, that a horse may go in and out alternately as he pleases, would greatly conduce to the health of the animal. This degree of liberty will be most needful when the flies are troublesome; and be better for him than confinement to a stable that is perfectly dark. In fly time it gives a horse much ease and comfort to smear his limbs, neck, and head, with rancid fish oil, or something else that will keep the flies from attacking him. And in all seasons, when horses have been heated with exercise, they should be well rubbed or curried.

When a horse runs in a pasture during the grass season, he should have some shelter, not only a shade to defend him from the intense heat of the sun, but a shed, or a clump of trees, that he may retreat from the inclemencies of the atmosphere.

But horses that are daily worked in summer should be mostly kept upon green fodder in stables, rather than grazed in pastures. The tendance of them will not be so burdensome, with a spot of high and thick grass at hand, as leading them to and from a pasture, at the distance of a quarter of a mile. This will prevent their being often chilled by feeding in wet nights. A large quantity of manure will thus be saved. And a very small quantity of land will answer, in comparison with what it takes for the pasturing of a horse. Keeping a scythe and a basket at hand, a horse may be foddered in this way in two or three minutes; and by the time that the whole spot has been once mowed over, that which is first cut will be grown up again. Where a number of horses are soiled, a pair of poles, or a hand-cart, will be better than a basket to carry the hay to them. This practice, called soiling, answers well near cities and large towns, where lands for pasturage are not plenty; and where, by means of the plenty of manure, lands may be made to yield the greatest crops of grass. For very thick grass should not be fed off; because the greater part of it will be wasted by the trampling and the excrements of animals.

When grain is given to horses it is an economical practice to have it either ground or boiled. When horses are soiled, or fed in a stable on green grass, it should be cut and carried in during the morning while the dew is on.

A disorder, called *ptyalism*, has for some years past been gaining ground among horses in various parts of the United States, which is an excessive watering or slavering at the mouth. Various causes have been assigned for this disorder, but none of them satisfactory. Soiling them is, however, a certain remedy.

The following remarks on the diseases of the horse were written by Dr. J. B. Brown, of Boston, and were first published in the New England Journal of Medicine and Surgery.

A knowledge of the diseases of animals, in general, cannot be inferred from a knowledge of the diseases of any one particular species of animals.

Thus he who is acquainted with the diseases of the horse would not from that circumstance be able to prescribe correctly for the diseases of quadrupeds generally. The anatomy and physiology of animals differ. For example, the dog has no insensible perspiration. The mouth of the horse performs but one office, that of conveying food to the stomach. It conveys nothing to the lungs, or from them. It has nothing to do with the modulation of his voice, as in most quadrupeds and in man. The passages to the lungs and to the stomach in the *horse* are distinct.

The horse, unlike most other quadrupeds, has no gall-bladder, notwithstanding a work which has been through *twelve* editions, and one at least in this country, (Taplin's Farriery,) gives a particular description of the diseases of the gall-bladder, and the *symptoms* of *those* diseases.

It has been stated above, that the anatomy and physiology of animals differ; so also do their diseases.

The horse is not subject to fever, that is, he has no simple, idiopathic fever, no cold, hot, and sweating stage, as man has. The feverish action which the heart and arteries of the horse sometimes assume is sympathetic, and is always preceded by some local affection. It is a disease of irritation.

The eyes of the horse are subject to a species of cataract, that affects no other animal. It arises from a constitutional disease, brought on by bad stabling. It is never produced by local injury. This species of cataract commences with an inflammation of the conjunctiva, without any apparent cause. Local applications have no effect in removing it. The only rational method of treating it is to remove, if possible, the constitutional disease, and improve the health and condition of the animal.

Oxen and cows have the disease called bots in their skin, but in the horse this disease (if it may be so called) is confined to the stomach.

Farcy and glanders, I believe, are diseases peculiar to the horse. I know of no other animal subject to them. They are contagious diseases, but may be produced without contagion, by bad stabling. The poisonous matter of farcy will produce glanders, and *vice versa.* Farcy is now ascertained to be a disease of the superficial absorbents; whereas in all the old books on the veterinary art it is represented as a disease of the veins.

A horse glandered has the whole mass of blood contaminated. This may be considered by medical gentlemen as an important fact, as it goes to prove the doctrine of humoral pathology. That the whole mass of blood is diseased, in a horse affected with glanders, has been proved by the following experiment, made by Mr. Colman, professor at the Veterinary Institution, England.

He took a young, healthy ass, an animal, as he states, peculiarly susceptible of the disease, and introduced a pipe having a stop-cock into the jugular vein, united by means of an ureter to another pipe, which he introduced into the carotid artery of a glandered horse. He then bled the ass to *death* by opening his carotid artery, and turning the stop-cock, admitted the blood of the horse into his vessels, and resuscitated him. The result was, that the ass became violently glandered He inoculated other asses from the matter produced in him, and was able to carry on the same disease.

Corns in the feet of horses are very unlike corns on the feet of the human subject. There is nothing which grows in the feet of horses that constitutes corns. There is no increase of substance. Corns in the feet of horses are mere bruises. Every body has seen or experienced the effects of bruises upon the human nail. Corns in the feet of horses are injuries of a similar nature. The red appearance which they have is caused by an extravasation of blood, which spreads itself among the fibres of the horny hoof. Corns are generally occasioned by the shoe. They may, however, arise from other injuries. They are easily cured by suitable remedies and a proper mode of shoeing, unless the inflammation occasioned by the injury has been of long standing, and assumed a chronic character. In this case, the cure is more tedious.

Horse-ail. I will take this opportunity to make a few remarks on the nature of this complaint.

Strictly speaking, all diseases of horses are *horse-ails;* but custom has given this epithet to a species of disease very common among our horses. The disease referred to is called *strangles* in most of the old books on farriery. It consists in an inflammation of the membrane lining the nose and the arytænoid cartilages. This disease is accompanied by a cough and discharge from the nostrils. The cough is sympathetic, and is produced by the extreme sensibility of the membrane thus inflamed. The lightest dust, or even a drop of water lodged upon this membrane, in this irritable state, produces coughing. The inflammation sometimes extends to the lungs, and then this disease is accompanied with a disease of the chest, and requires speedy and energetic treatment, as inflammation of the lungs *in the horse* is apt to terminate speedily in gangrene. Copious bleeding, from six to ten quarts at first, and smaller bieedings afterwards, as the state of the case may require, and small doses of aloes, from one to two drachms, given daily, have been found the most successful remedies in inflammation of the lungs. Drastic purgatives should be avoided, as they increase the irritation and put the life of the horse in extreme hazard.

It has been stated above, that the diseases of animals differ as much as their anatomy and physiology. The specific effect of medicine upon different animals is no less various than their structure and diseases.

Glauber salts, in doses of one pound, operate on the *ox* as a cathartic, but on the *horse* they operate principally as a diuretic. Castor-oil does not operate on the horse as a purgative, any more than train-oil or any other oil.

Opium does not produce its specific effect upon the horse.

It operates merely as an astringent. It has no anodyne effect, as it has upon man. It will not mitigate pain. It is unfortunate that most writers on the veterinary art have copied from each other, and have recommended medicines for the horse which are known to be useful to men. Thus calomel, rhubarb, and colocynth, have been recommended as purgatives for horses, whereas they are now known to have no such effect on that animal.

Bark produces no sensible effect upon the horse.

There are no medicines that operate on the horse as ipecacuanha and tartar emetic do upon the human subject.

Tartar emetic, in doses of four ounces, will sometimes occasion a little nausea and purging, but in smaller doses it has no sensible effect. No preparation of mercury will produce salivation in the horse. His gums may be made sore by mercury, but ptyalism cannot be produced by it.

Sugar of lead, which is known to be a most deadly poison to man, the horse can take without injury. Tobacco has no deleterious effect upon the horse.

Hellebore, in doses of half a drachm, produces a tendency to nausea in the horse. Hemlock is good food for goats, but a deadly poison to man; and wheat, the natural food for man, is poison to the horse. Spirit of turpentine, which an infant may handle without injury, operates as caustic when applied to the skin of a horse, although it may be applied to sores and fungous flesh on that animal without producing pain.—*N. E. Journal of Medicine and Surgery.*

The following judicious remarks on the management and diseases of horses, &c., are taken from an English publication.

The Stable. As the preservation of health ought to be considered as an object of equal, if not superior, importance to that of curing or alleviating disease, and as it can only be accomplished by a proper management of the horse with respect to feeding, exercise, and the general economy of the stable, I think it proper to begin with this subject.

In the construction of a stable there is, perhaps, no circumstance more deserving attention than that of ventilation, or of having contrivances for the ready admission of fresh air, and for the escape of that which has been rendered impure by breathing; and it is really extraordinary that so little attention should have been paid to so important a circumstance. Grooms in general make a point of closing every aperture they can find; and if, at any time, they are prevailed upon to open a window, it is commonly so small, and so inconveniently situated, as to be but of little service. Let any one for a moment consider how foul an atmosphere must be produced in a close stable, in which several horses are kept, by the constant exhalation of unwholesome vapors from the litter, by the steams of perspiration from the skin, and by noxious airs from the lungs, and he will not be surprised at the long catalogue of diseases to which this improper treatment must subject these useful animals.

If a doubt remain in the mind of any one as to the impropriety of such close stables, let him enter one early in the morning, on its being first opened, and he will experience such a painful sensation in the eyes, and so violent a cough, as will afford him the most convincing proof of the noxious and stimulating nature of such an atmosphere; yet such is the obstinacy and ignorance of grooms in general, that they cannot be prevailed upon to abandon this injurious practice. Even at this time stables are generally built too low, and unprovided with effectual means of ventilation.

A stable should be as lofty as it can be made conveniently, at least twelve feet; the foul air will then circulate in the higher parts, and the animal will not be constantly breathing an unwholesome atmosphere, which he must do when the ceiling is scarcely higher than his head. Proper apertures must be also made in the ceiling, communicating with the atmosphere by square wooden tubes, so contrived as not to admit the rain into stables; the foul air and other unwholesome vapors will then readily pass off, while a proper quantity of fresh air may be admitted by means of windows. The next circumstance to be attended to is nearly connected with, and not less important than ventilation; namely, the so constructing a stable as to be able to regulate its temperature, or keep the air at any degree of heat that may be thought proper. It is generally allowed, that a uniform temperature in a stable is very desirable; and it is certain, that many of the diseases of horses are caused by sudden changes in this respect. Even slight variations of temperature, if frequent, are injurious; yet few stables are to be found where this inconvenience is effectually guarded against. To accomplish this desirable purpose, the windows should be in different sides, so that when a cold wind blows from any point it may be shut out, while fresh air is admitted by the opposite window. There should be several of the apertures we have described in the ceiling, that they may be occasionally shut, either wholly or partially, so that, by means of these and the windows, the temperature can at any season be easily regulated, according to the weather or state of the horse's health, more accurately if a thermometer be kept; an instrument which appears to be a necessary appendage to a well-conducted stable. If, during the cold days of winter, the contrivance we have proposed should be found insufficient to raise the temperature of the stable to the desired point, the air may be easily warmed to any degree by means of stoves placed on the outside, with iron chimneys passing through the stable. It may be placed in the saddle-room: this, however, is scarcely necessary.

Light is also a thing of much importance in the construction of a stable; and, for the purpose of admitting it readily to every part, the windows should be large and properly placed.

There is no doubt that the eyes of horses are often injured by dark stables; and when a horse is just taken from a dark situation, it is easy to perceive that light at first irritates the eye and gives pain; and this is more remarkable when he is brought suddenly into the sunshine; nor is it to be wondered at, that so delicate an organ as the eye should suffer materially from the frequent repetition of this sudden change.

Though a light stable is desirable, the sunshine should not be allowed to fall on the eyes of a horse as he stands in his stall; nor should the walls or ceiling be of a white color, as, under such circumstances, the eyes would be over stimulated and rendered weak: and when it is considered how liable horses are to diseases of these organs, and how frequently they terminate in blindness, no one will think any circumstance tending to their preservation too trifling to be noticed. With regard to the best color for the walls and ceiling, a stone or dove color is perhaps to be preferred, and may be made by mixing a little lampblack, ivory-black, or blue-black with the common white-wash.

The door should be larger and higher than we usually see it; for horses are very liable, in passing through a narrow or low one, to strike their hips or heads. I have seen some troublesome accidents happen in this way; besides, even if the hair be struck off about the hips, it is thought a blemish, because it may not grow again; or, if it do grow, the hair may be white.

In fitting up the interior of a stable, particular attention must be paid to the size of the stalls, which should not be less than six feet wide, and the sides sufficiently high to prevent any sort of contact or communication between the horses. I know it will be urged as an argument against this, that they are sociable animals, and thrive better with a companion than when alone; this is certainly true: but, on the other hand, I am convinced, from long observation, that horses do not feel themselves in solitude when they are thus prevented from touching or playing with their neighbors; besides, if we consider the numerous accidents that happen from low stalls, how frequently they kick or bite, and otherwise injure each other, there can be no doubt, I think, of the superior advantage of high stalls.

The stalls should also be of considerable depth, that a horse may not, by drawing back, have the power of kicking those in the adjoining stalls.

The floor of the stall should be made of hard brick, as a more equal surface is then formed than can be obtained by paving with pebbles. Very little declivity is necessary to drain off the urine; and as great inconvenience sometimes arises from suffering a horse to stand in a stall where the fall is considerable, creating unnecessary exertion in the muscles of the hind leg, and keeping the ligaments constantly in a tense state, it has been recommended to make the drain in the middle of the stall, whereby the hind and fore feet of the horse might stand on a level. In whatever way, however, the stall is made, it should be carefully cleaned twice a day, that none of that putrescent matter may accumulate which generates ammonia, or that pungent vapor which is so abundantly found in close, filthy stables. An iron rack is preferable to one of wood, being more easily kept clean, and furnishing no splinters; which, where wooden racks are used, sometimes injure the mouth. The manger may be so contrived as to slide into the wall like a drawer; and then, while the groom is wisping him, he would have nothing to lay hold of with his mouth, by which practice horses often become crib-biters. The height both of the rack and manger should be such as to enable the horse to feed with the greatest ease: the former is sometimes made so high that the horse is obliged to exert the muscles of his neck considerably in order to reach it; and this has been so placed, under an idea of its having a tendency to make him carry his head more gracefully: it is more probable, however, that the only effect of it is to make the horse uncomfortable while feeding. It has indeed been lately recommended, as the best plan, to place the racks on a level with the manger, so that the horse may feed as he does in a state of nature. This plan is a good one. It has been tried both for wagon and saddle horses, that is, both single and double, and found to answer extremely well. It was observed, however, that some horses would throw out part of the hay with their noses when it was of a bad quality; but by placing one or more bars across on the upper part, from the front to the back, this was effectually prevented. The manger should be rather wide, and not less than eighteen inches deep. When a horse is fed principally with chaff or cut hay, a deep manger is particularly necessary, as many horses, in endeavoring to pick out the oats from the chaff, will throw out a great deal of the food with their noses when the manger is shallow. In larger stables, where many horses are kept, such as post or wagon stables, each stall is to contain two horses, which will require a space of twelve feet. A manger is placed at each end, and the hay crib in the centre. A very short halter is sufficient to allow the horses to lie down, and then there is no danger of entangling themselves with it, an accident that often occurs when long halters are used. La Fosse, in his *Manuel d'Hippiatrique*, says that the fall in the floor of the stall should not be more than one inch to two yards: and this, I think, is quite sufficient. The gutter behind the stall is commonly too deep, and often so placed as to be in the way of the horses' hind feet. When a stable is properly attended to, scarcely any gutter is required; and when there is one, it should be very shallow and wide.

When a stable is ventilated by means of a tube or chimney, it should be placed in the centre of the ceiling, the opening in which should be large, in proportion to the number of horses kept; it cannot well be too large, but may be contracted upwards, so as to have a conical shape, or it may be made so as to resemble a dome or cupola. It should be carried a few feet above the top of the roof, and have lateral openings by means of slanting boards, but closed on the top; by which contrivance there would be a free communication with the atmosphere, and the rain would be effectually excluded.

There have been different opinions held with respect to the removal of the litter during the day; but when we consider how rapidly and abundantly ammonia or the volatile alkali is generated in it, and how injurious that vapor is to the eyes and lungs, there can be no doubt of the propriety of removing it. Dr. Egan, of Dublin, has discovered, according to Mr. Peall, that the urine of the horse begins to generate volatile alkali very soon after it is voided; and it is well observed by the same author, that if this vapor be capable of painfully stimulating a sound and healthy eye, its effects upon one that is inflamed, and consequently extremely irritable, must be both highly painful and prejudicial to the organ. In confirmation of this opinion, the author relates the following experiment: A horse laboring under inflammation of the eye was removed from the stable, where he kept both eyes constantly shut, and placed in a cool, airy situation; in the space of half an hour he began gradually to open his eyes, and in the space of two or three hours he kept them open boldly. The horse was again placed in the stable, and in a few minutes he began gradually to close the eyes, and after an hour or two kept them constantly shut. Not satisfied, however, with this experiment, though it seems pretty conclusive, the horse was again removed to the cool situation, and the same effect followed as at first. If the vapors produced by foul litter prove so injurious to the eyes, it cannot surely be less prejudicial to the lungs; and it is highly probable that if coughs are not produced in this way, they are often aggravated and rendered incurable by those irritating effluvia. Another evil to be considered is the propensity observable in many horses to eat their litter. This is often the case with such as have a chronic cough, or are disposed to become brokenwinded, or have worms; and in all these diseases there is nothing, perhaps, more likely to increase them than the animal's eating foul litter. It must be obvious that horses employed in severe labor should be allowed to lie down whenever they are inclined to do so; but even then all the litter may be turned out early in the morning, the floor of the stall swept perfectly clean, and a bed of fresh straw put in. If the foul litter be spread abroad in the open air, and shaken up two or three times during the day, the greater part would be again fit for litter, and, with the addition of a little fresh straw, would serve to replace that upon which the horse has rested during the day. It has been said, that horses which stand constantly on litter are apt to feel the difference of the road and become tender-footed. Mr. Clark observes, that the heat arising from the litter occasions a more than ordinary derivation of blood to the legs and feet; and hence arise swelling or gourdiness of those parts, greasy heels, and stiffness or numbness. If the horse lies down for relief, the heat of the litter soon forces him to get up again, and after repeatedly lying down, and forced to get up immediately from the above cause, he attempts it no farther; he stands upright, or perhaps a little straddling, often shifting the weight of his body from one leg to the other. This erect position, in which he is obliged to stand, increases the swelling of his legs, &c., and recourse is then had to bleeding, purging, diuretics, &c.

Lord Pembroke, in his Military Equitation, observes that after working, and at night of course, as also in lameness and sickness, it is good for horses to stand on litter; it also produces staling, &c. At other times, it is a bad custom; the constant use of it heats and makes the feet tender, and causes swelled legs; moreover, it renders the animal delicate.

Swelled legs may be often reduced to their natural size merely by taking away the litter, which, in some stables, where ignorant grooms and farriers govern, would be a great saving of physic and bleeding, besides straw.

Lord Pembroke has noticed by repeated experiments, that legs swell or unswell by leaving litter or taking it away, like mercury in a weather-glass. Mr. Blaine is of opinion, that the custom of standing on litter ruins more horses than all the mails or stage-coaches put together; that it is the fruitful source of contracted feet, and brings on that ruinous affection with more certainty than the hardest work. In my own stables (he says) no litter is ever suffered to remain under the fore-feet during the day. The horses stand on bare bricks, which, in summer, are watered to make them more cool; by which means I have experienced astonishing benefit. Behind, a little litter is strewed, because they are apt to kick and break the bricks with their hind feet; and because the litter thus placed sucks up the moisture of the urine, which would be detrimental to the hinder feet, which are more liable to thrushes than contraction.

Colts. ' " Colts are usually foaled about the beginning of summer, and it is the custom to let them run till Michaelmas with the mare, at which time they are to be weaned. When first weaned, they must be kept in a convenient house, with a low rack and manger for hay and oats; the hay must be very sweet and fine, especially at first, and a little wheat bran should be mixed with their oats, in order to keep their bodies open, and make them eat and drink freely. When the winter is spent, they should be turned into some dry ground, where the grass is sweet and short, and where there is good water, that they may drink at pleasure. The winter after this, they may be kept in the stable, without any farther care than that which is taken of other horses. But after the first year, the mare foals and horse foals are not to be kept together. There is no difficulty to know the shape a foal is like to be of, for the same shape he carries at a month he will carry at six years old, if he be not abused in after keeping."

'We often hear it lamented, that our breed of horses is bad. But I am convinced that, as our colts are managed, if we had any other breed, we should soon make it appear to be as mean as our own, if not worse. The abusing of colts in the first winter is the principal cause of their proving so bad; for our farmers seldom allow their weaned colts any food besides hay, and that is not always of the best kind. So that they seldom fail of being stinted in their growth, in the first winter, to such a degree, that they never get the better of it. A colt that is foaled late should not be weaned till February or March, and should have oats during the whole of the winter. In some countries, they allow a young colt fifteen bushels. We need not grudge to feed them with meal, oats, and bran, besides the best of clover hay; for they will pay for it in their growth. After the first winter, they will need no extraordinary feeding till they are grown up. Were the above directions observed, we should soon see an improvement of our breed of horses. They would be capable of doing much greater service, and be likely to hold out to a greater age.'—*Deane.*

For farther remarks on the management of colts, and training or breaking them for service, see page 67 of this work.

MANGEL-WURTZEL. '*Field Culture of the Mangel-wurtzel Beet and the Sugar Beet. Soil and Preparation.* The soil for these roots should be a loam, inclining to clay, in good tilth, well manured, and made fine to a good depth. John Hare Powel, Esq., corresponding secretary to the Pennsylvania Agricultural society, in giving an account of his mode of cultivating this crop, says, "My soil was not naturally strong; it has been gradually so much deepened as to enable Wood's plough, No. 2, drawn by four oxen, to plough fourteen inches deep. Fresh barn-yard manure was equally spread upon the surface, and ploughed under in the early part of April, in quantities not larger than are generally used for potato crops in this country. Early in May, the land was twice stirred with Beatson's scarifier, harrowed, rolled; after stirred, harrowed and rolled again in the opposite direction." The soil on which Messrs. Tristram Little and Henry Little, of Newbury, Massachusetts, raised their premium crop in 1824, is a clay loam. In 1823, about three-fourths of the same was sowed with onions, and manured with about eight cords of compost manure to the acre. The other quarter was sowed with wheat without manure. In the fall of 1823, there were about ten cords of compost manure drawn on the lot, and put in a heap. Most of the said compost was drawn from the salt marshes, when ditching the same; the other part was from the barn-yard. In the month of April, 1824, the heap was thrown over, and well mixed.

'*Planting*. Colonel Powel says, "The holes for the seeds were made by a wheel, containing pegs in its circumference, which penetrated the ground about an inch, leaving intervals of four inches; the rows were made two feet asunder; two capsules were dropped into each hole: the wheel of a common barrow was passed over them, thus compressing the earth, and leaving a slight rut for the retention of moisture."

'Messrs. Tristram and Henry Little observe, that, "Between the 8th and 11th of May, the land was ploughed and sowed in the following manner:—After one deep ploughing, the ground was furrowed two and a half feet apart, and the manure put into the furrows, and covered with a double mould-board plough; a roller was then passed on the top of the ridge, and the seed dibbled in with the finger over the manure, about six or eight inches apart." The quantity of seed, according to English writers, is four pounds to an acre. Mr. David Little, in obtaining a premium crop, sowed four pounds, but observed that he thought half that quantity would have been sufficient.

'*After-culture*. In raising colonel Powel's crop, "A small cultivator, which I had contrived for the purpose, was drawn between the rows soon after the weeds appeared; a three inch triangular hoe removed the alternate plants, leaving the others at distances varying from eight to twelve inches asunder. The cultivator was twice used before the 20th of July.

The heavy rains of August made another hoeing necessary, and surcharged the ground so much with moisture, that all roots increased much less in that month than during the same time in the two last years." The Messrs. Little, "in the course of the season, thinned their plants, and left them from six to twelve inches apart in the rows. They were once hoed, and ploughed three times between the rows." Mr. Powel, in raising a previous crop, had placed the rows thirty inches apart, and left the plants six inches apart in the rows. He says, "I this year desired smaller roots, which might grow so closely as by their leaves to protect the soil as much as possible from the rays of the sun. My cultivator, by its peculiar form, enabled me to cut off the weeds when the plants were so young, that, if I had applied the plough, their crowns must have been covered in many instances by earth occasionally falling from its land side. The failure which attends the cultivation of most root crops in drills, proceeds from the neglect of weeds in their early stages. Four or five days of delay frequently make the difference of fifteen days in the labor of making clean an acre of ground. The same weeds which a boy with a sharp shingle could remove at the commencement of one week, may before the end of the next require the application of an implement drawn by a horse.

'"I ascribe my success, in great measure, to the use of *Wood's extraordinary plough*, which enters the soil more deeply, and pulverizes it more perfectly, than any other I have ever seen, with equal force, in any country; to the use of cultivators, which complete the production of fine tilth; to the destruction of the weeds on their first appearance—leaving the smallest space upon which a horse can walk between the rows; and, above all, to *planting the seeds of a proper kind upon a surface which is kept perfectly flat.*"

'*General Remarks.* Agriculturists have not agreed whether it is most expedient to plant the seeds of this root on ridges or on a level. Colonel Powel condemns planting on ridges in this country, as a practice not adapted to our soil and climate, in which vegetables are very liable to suffer by drought. He says, "Among the various practices into which we have been seduced by the plausible theories of the advocates of European husbandry, there is none which appears to me more absurd than that which has led us to drill or dibble our crops on ridges. The English farmer wisely contends with the evils produced by too much rain; the

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American husbandman should as anxiously guard against his most formidable enemy, drought. I am inclined to think that there is no crop cultivated in this state (Pennsylvania) which ought not to be put on a flat surface." The climate of New England, especially its northern part, is not so warm and dry as that of Pennsylvania, and in that part of the United States, perhaps, the nature of the soil should decide the question; if dry, level planting, or if moist, ridge planting should be adopted.

We have heard complaints from American farmers, that the seed of this root is slow and uncertain in coming up. Perhaps the seed or soil, or both, may sometimes be too dry at the time of sowing. A writer in the *English Farmer's Journal* says, "I have of late years steeped my seed for at least forty-eight hours. I made an experiment with twenty sound seeds not steeped, twenty steeped twenty-four hours, and the same number steeped forty-eight hours; every seed of the latter produced plants, which came up two or three days sooner than either of the others, and some of those not steeped did not come up at all." Mr. Cobbett, in treating of the culture of the common garden beets, (*American Gardener*, par. 198,) directs to soak the seed four days and nights in rain-water before it is sowed; and observes, that the mangel-wurtzel should be cultivated in the same manner as the other kinds of beets. American writers, so far as we have observed, give no directions for soaking the seeds of this vegetable before planting; and it is possible that the omission of this part of the process may cause the slowness and uncertainty of vegetation complained of. The capsule, or husk, which contains the seeds, is dry, and it requires a long time for the moisture which it may derive from the earth to penetrate this integument, so as to cause the seed to sprout. But if the soil be very moist at the time of sowing, soaking the seed had better be omitted.

'Much has been written and said on the subject of stripping these plants of their leaves for feeding cows and other economical purposes. An English writer observes, that six or seven crops of leaves and stocks may be taken off during the growth of the root. Women and children can take off the leaves, which is done as follows: they should place their hands on each side of the root, at the foot stalks of the leaves, leaving about six of the smallest central leaves between the fore-finger and thumb of each hand; (the small leaves are to be left on the root to grow, to make a fresh top;) then, spreading the hand flat with their face downwards, push them both at the same time towards the ground, and thus, by one motion, will the whole of the top of each root, except the small leaves to be left to form a fresh head, be removed without unsettling the root or its fibres, which would check its growth. Some affirm, that stripping the plant of its leaves is no injury to the root, and others are of opinion that the root is injured by this means. We have doubts, whether, in field cultivation, it will often be deemed expedient to expend time and labor in this manner. The thinnings, or superfluous plants, however, should be preserved, as they make excellent food for milch cows or store swine.

'Some cultivators affirm, that it is never worth the trouble to transplant these roots to fill vacancies. "I have seen," says an English writer, much labor and expense employed in transplanting into vacant spots, when the seed has not been dibbled thick enough, but have never seen the transplanted roots worth half the trouble; the tap-root being broken in the drawing, nothing but the top and useless rough roots and fangs are produced. It has been remarked by other writers, that the most common cause of failure in transplanting this root is the taking them up when too small, before the plants have obtained strength and size sufficient to bear the operation of transplanting.

'*Use.* The following remarks are from a paper communicated to the trustees of the Massachusetts Agricultural society, by J. Lowell, Esq., president of said society. They are derived, principally, from a French publication, by the Abbé Rosier.

'"This root is very little affected by changes of weather. It is attacked by no insect; drought affects but little its vegetation. It prepares the land extremely well for other crops. It may be sown and treated precisely like the common beet, except that it ought to stand eighteen inches asunder.

'"In good land, they often weigh nine or ten pounds, and are stripped eight or nine times. In a light, sandy, but well manured soil, they sometimes weigh fourteen and even sixteen pounds each!

'"The first crop of leaves in France is taken off in the latter end of June, or the beginning of July. In this country, probably, the latter period would be preferable. The lower leaves, those which incline towards the ground, are those which are taken away, and care must be taken to preserve the top-leaves, or the crown of the plants. The leaves may be taken off every fifteen days after the first gathering. Oxen, cows, and sheep, devour them greedily, and fatten readily upon them. All domestic poultry eat them readily, when chopped fine and mixed with grain. Horses will feed upon them very well, mixed with chopped straw. Hogs also fatten upon them.

'" Cows fed upon this root solely give a greater quantity of milk and cream, and of better quality for the first fifteen days, after which they grow too fat, and the milk lessens. The food of cows must therefore be varied. Oxen and sheep fatten very well upon them. Cows should have grass in proportion of one-third to the beet leaves, or every third day they should be turned to grass. In this mode their milk will be excellent. The trouble of gathering the leaves is less than that of gathering any other green fodder. It may be done by children, while men are required to cut other green food for cattle. It is the surest crop, since the plant will stand the longest droughts. The roots are gathered and treated like those of the common beet. The skin is very tender, and care should be taken to handle them so as they may not be wounded, as they will, in that case, not keep so well. In order to preserve the seed in purity, care must be taken to change the ground in which the seed beets are planted. The seed can be preserved, after it is gathered, three or four years, without injury. In giving these roots to cattle for food, they are first washed, and then cut up into pieces about the size of a nut. It is always best to accompany them, when given to horned cattle, with clover, or other hay or straw, and if the hay or straw has been previously cut fine, it will be preferable. If horses are fed with this root, with a proportion of hay or cut straw, (half of each,) they will be fat, vigorous, and healthy. If they are worked severely, a little oats or corn may be added. It is thus they are treated in Germany, where this root stands in the stead of meadows or grass lands, and whose excellent horses are well known.

'" Hogs, fed upon them raw, after they have been cut up fine and mixed with milk or other drink, fatten as well upon them as upon boiled potatoes, by which the fuel and trouble of boiling is saved.

'" As to the quantity given to animals, much will depend on the proportion of other fodder which you allow them. Cows fed twice a day in winter upon eighteen pounds of these roots at each time, together with four pounds of hay or chopped straw, will give as much and as good milk as in summer, and they will be kept in the best possible state.

'" Oxen fed with forty weight of these roots per day, with ten pounds of hay, for one month, and after that with fifty weight per day of the roots alone, will be fat enough for sale in two months more.

'" Any person disposed may, from the facts above stated, calculate how many cattle will be supported by a single acre of land on which this plant is cultivated.

'" Man can eat this vegetable throughout the year; it is agreeable and healthy. No insect attacks it, and it suffers but little from the variety of the seasons. The leaves of this plant form alone an excellent food for every species of domestic quadruped, during four months in the year. Turnips and other vegetables are, besides, liable to be destroyed by insects, whereas this beet is not. The roots can be preserved eight months in a sound state, while turnips are of little value after March. In some soils turnips will not grow, particularly in those which are very stiff or strong. The root of scarcity grows everywhere. The milk of cows fed on turnips has a bad taste; that of those fed on this plant is excellent, as is also the butter made from it. This forage on green fodder comes also at the hot seasons, when almost all other green food is scarce, and sometimes not to be procured. Cattle never get tired of it. In many parts of Germany, where it is raised with success, they prefer it to every thing else to fatten those large herds of cattle which they annually export to France. In feeding cattle with beets, the same dry food must be given which is usually given with turnips."

'Colonel Powel observes, "My neat cattle prefer mangel-wurtzel to any roots which I have offered to them. I have found its effects in producing large secretions of *good* milk very great. I selected, in November, two heifers of the same breed, and very nearly of the same age, and in similar condition; they were fed in adjoining stalls, and have been fed regularly three times a day, by the same man. One of them has had three pecks of mangel-wurtzel and four quarts of corn-meal daily; the other, four and a half pecks of mangel-wurtzel. The last, which has had mangel-wurtzel alone, is in the condition of good beef; the other is not more than what graziers call half fat.

'" The application of mangel-wurtzel as food for sheep is not the least important of its uses. Ewes yean usually at the season when grass cannot be supplied. The health of themselves and the thrift of their lambs essentially depend upon succulent food being had. I am inclined to think, that no small portion of the success which English breeders have met, is to be ascribed to the large stores of roots which they always have at command. It cannot be denied, that Indian meal will of itself, in most cases, produce extraordinary fatness, as well as great size; but I have been led to believe, that diseases are early engendered by this species of forcing, which is always expensive, and too often eventually destroys the animal which has been thus reared."

'Messrs. T. and H. Little observe, as to the value of the roots for feeding stock, "there is a variety of opinions; but, from a number of years' experience, we think them a valuable addition, and highly worth cultivating. Comparing them with English hay, and we know of no better standard, in our opinion, three tons of mangel-wurtzel, or potatoes, (of the two, we value the mangel-wurtzel the highest,) are equal to one ton of hay, for feeding stock generally; but for milch cows, we think two tons of equal value. For feeding store swine, mangel-wurtzel is the only root that we know of which we can cultivate and feed to profit. Six bushels of raw mangel-wurtzel we think equal to one bushel of Indian corn."

'*Quantity to an Acre.* The premium crop of the Messrs. Little was thirty-three tons ten hundred weight and fourteen pounds on an acre. Colonel Powel inclosed certificates to the president of the Pennsylvania Agricultural society, showing that sixteen hundred and thirty-four bushels of mangel-wurtzel, weighing seventy-eight thousand four hundred and forty-eight pounds, were produced upon one acre and fourteen perches; and a part of the same field, containing thirteen contiguous rows, produced at the rate of two thousand and sixty-five bushels per acre, weighing forty-four tons five hundred and twenty-seven pounds. In Great Britain, it is said that upwards of sixty tons have been raised on an acre.

'*Gathering and Preserving.* In gathering the roots, care should be taken to cut off the leaves about half an inch above the crown, as they will not keep so well if cut more closely. Messrs. Tristram and Henry Little say, "As to the best mode of preserving them, we have tried divers ways,—by pitting them, by putting them into a barn and covering them with hay, and by putting them into the cellar; the last mode we think the best." Colonel Powel observes, that one of his crops was "piled in a cellar, in rows, as wood, and covered with sand." A writer in the *English Farmer's Journal* observes, that he has practised, with success, the following mode of preserving this root: "I pack it in long heaps, about seven feet wide at the bottom. I begin by forming the outsides with the roots, not stripped of their tops; tops outwards; the internal parts to be filled with roots without leaves; continue one layer over another, until the heap is about six feet high, and about two feet broad at top, which may be covered with straw and earth; the ends of the heap should be covered in the same way: the leaves form an efficient covering against rain and frost."

'Mr. M'Mahon's mode of preserving beets and other roots is as follows: "Previous to the commencement of severe frost, you should take up, with as little injury as possible, the roots of your turnips, carrots, parsnips, beets, salsify, scorzonera, Hamburg or large-rooted parsley, skirrets, Jerusalem artichokes, turnip-rooted celery, and a sufficiency of horseradish, for the winter consumption; cut off their tops, and expose the roots for a few hours, till sufficiently dry. On the surface of a very dry spot of ground, in a well sheltered situation, lay a stratum of sand two inches thick, and on this a layer of roots of either sort, covering them with another layer of sand, (the drier the better,) and so continue the layers of sand and roots till all are laid in, giving the whole, on every side, a roof-like slope; then cover this heap or ridge all over with about two inches of sand, over which lay a good coat of drawn straw, up and down, as if thatching a house, in order to carry off wet and prevent its entering the roots; then dig a wide trench round the heap, and cover the straw with the earth so dug up, to a depth sufficient to preserve the roots effectually from frost. An opening may be made on the south side of this heap, and completely covered with bundles of straw, so as to have access to the roots at all times, when wanted either for sale or use.

'"Some people lay straw or hay between the layers of roots, and immediately on the top of them; this I do not approve of, as the straw or hay will become damp and mouldy, and very often occasion the roots to rot, while the sand would preserve them sweet and sound.

'"All these roots may be preserved in like manner in a cellar; but in such a place they are subject to vegetate and become stringy earlier in spring. The only advantage of this method is, that in the cellar they may be had when wanted more conveniently during winter than out of the field or garden heaps.

'"*Note.* All the above roots will preserve better in sand than in common earth; but when the former cannot be had, the sandiest earth you can procure must be dispensed with."'

RUTA BAGA. The following is an account of the method of cultivating ruta baga, adopted by Rev. Henry Colman, in obtaining a crop for which he received a premium of twenty dollars from the Massachusetts Agricultural society, in the year 1830. From the New England Farmer, vol. ix. p. 284.

Gentlemen—Accompanying this you have the certificates of a crop of ruta baga raised this year on my farm in Lynn. From these it will appear that on an acre, measured by a sworn surveyor, on one side of the field, there were gathered seven hundred and forty-one baskets full; and that forty baskets of the above-named weighed at the town scales two thousand seven hundred and fifty pounds net weight. This, allowing fifty-six pounds to a bushel, the standard weight assumed by the society, would give a crop of nine hundred and three bushels to the acre.

The turnips were planted on the 29th of June and 2d of July; about one pound and a half of seed was used for the acre; and they were gathered and stored in cellars and in the barn, in the last part of November.

The ground on which they grew is a good soil, neither wet nor dry, and bore the last year an abundant crop of onions, and corn the year preceding the last. It was well manured at both times, and in fine tilth. It was manured with at least six cords to the acre of barn manure the last spring, and sowed again to onions; but the seed entirely failing, it was ploughed, harrowed, furrows struck out, and about eight cords of barn manure spread in the furrows; ploughed again so as by a back furrow to form a ridge over the manure, and the seed sown with a small drill-harrow on the ridges, making the rows about twenty inches asunder.

As soon as the plants were of sufficient size, a drill-harrow, with small shares fixed to it, to cut off all the weeds, was passed through the rows; and the plants thinned with a small weeding hoe to the distance of about eight inches apart, and the vacant places filled up by transplanting from the supernumerary plants. They were once more harrowed and cleaned, which was a very small labor; and owing to the very unpropitious weather, were not harvested until very late. Some of them were very large; one weighed fifteen pounds, and many were nearly as large. The exact expense of cultivating the acre cannot be estimated, as it was intermixed with other farm work; but the whole, from the sowing to the gathering, was not two-thirds of the labor usually bestowed on planting, cultivating, and gathering an acre of potatoes.

My Swedish turnips the last year, of which I raised considerable quantities, were fed off to my oxen, dry cows, young stock, and fatting sheep. To the cattle they were of very great advantage; and for feeding sheep, they proved the last year, by an accurate account, worth from ten to twelve and half cents per bushel. The man who has the care of my stock considers them as among the most profitable feed which can be given either to fatting or to store cattle. Three years' experiment has increased their value very much for these purposes in my own estimation.

I am, gentlemen, very respectfully yours,

HENRY COLMAN.

A correspondent in the New England Farmer, vol. xi. p. 277, writes thus:

'A wish to have others profit by my experience has induced me to send you, Mr. Editor, half a sheet of remarks on the culture of the ruta baga as a food for domestic animals. I have cultivated from half an acre to three acres of this root every year for thirteen years in succession, and feel competent to give rules for its culture, and confidence in recommending it as a valuable and profitable crop.

'The soil must be rich and dry; and the more it inclines to a sand loam the better. Clay is the worst, and wet soils will not answer at all.

'*Preparations.* My general practice has been, to manure well a piece of pasture, or clover ley, from which the hay has first been cut, plough it handsomely over, and harrow it well.

'*Sowing, &c.* I sow in rows, at two and a half or three feet, with a drill-harrow. The sooner the preceding operations succeed each other the better. I have sown broadcast, but the expense of thinning and culture is increased. A man will drill in three or four acres a day. We allow a pound of seed to the acre, though half this, properly distributed, is enough. Sow from the 26th of June to the 10th of July.

'*Culture.* I use a cultivator, that may be graduated to the space between the rows, drawn by a horse, as soon as the plants can be well distinguished. This is repeated in a few days, back and forward, and the implement carried so close to the drills, as to leave only strips of from four to ten inches, which are then thoroughly cleaned with a skim hoe, and the plants thinned to eight and ten inches' distance. The cultivator soon follows for a third time, and if necessary the skim hoe, when the crop is generally left till harvest. The great aim is to extirpate the weeds, and to do this while they are small.

'Harvesting is postponed as long as the season will permit. The roots are then pulled up and laid on the ground, the tops of the two rows towards each other. The pullers are followed by a man or boy with a bill-hook, who with a light blow cuts the tops as fast as three or four can pull. Three men will in this way harvest, of a good crop, three hundred bushels in a day. The tops are gathered into heaps and taken to the yard in carts daily, for the stock, until they are consumed. An acre will give from five to ten cartloads of tops. The roots are piled in the field if dry; the pits, two or two and a half feet broad, covered with straw and earth, and as cold weather approaches, with manure, to prevent frost. N. B. With a crow-bar make one or more holes on the crown of the pit, which must be left open, to let off the rarefied air and prevent the roots from heating.

'*Use.* The tops serve for autumn. As soon as the mild weather of spring will justify, I break through the frost, and take the contents of a pit to my barn, and cover the roots with straw or hay. From thence they are fed to my stock, being first chopped up with a *snik,* (Dutch meat-chopper,) or spade. They are excellent for sheep, especially for ewes that have young; and hogs and horses eat them freely. Steamed, they are used in the north of England for horses as a substitute for grain. I have fattened sheep and bullocks upon them with profit. They constitute, particularly from February to June, an excellent culinary vegetable for the table. A bullock will thrive fast upon two bushels a day, and will consume hardly any hay, and requires no drink.

'*Product and Cost.* My average crop has been six hundred bushels per acre, though others have raised much heavier products. The cost in manure and labor, when they are secured for winter, has been from two to three cents per bushel.

'N. B. Cattle or sheep fattened upon this root should be kept from eating them for eight or ten days before they are slaughtered, otherwise the meat will have an unpleasant savor. J. B.'

ENGLISH TURNIPS. Every farmer will find it profitable to raise a quantity of these roots. The mangel-wurtzel and the ruta baga, useful as they undoubtedly are, will not completely supersede, nor altogether supply the place of the old-fashioned English turnip. In the Memoirs of the Board of Agriculture of the State of New York, vol. i. page 26, we find the following remarks on the best mode of cultivating this valuable root.

'There is no difficulty in raising turnips on new land; but it is very desirable to know the best mode of raising them, at least a small patch every year, on old farms. Mr. Henry De Bois, of this county, [Rensselaer] and major E. Cady, of Columbia county, say that they have succeeded in obtaining good crops several years in succession by the following process. Turn over a turf of old sward the first week in June. Yard your cattle at night on this, in the proportion of six head at least to a quarter of an acre, until the 20th of July. Then harrow lengthwise the furrows, so as not to disturb or overturn them, and sow in the proportion of about half a pound of seed per acre.

'If it is not convenient to yard cattle upon it sufficiently, about two inches of well rotted manure harrowed in as above will do as a substitute. Mr. C. R. Colden applies the manure by strewing it in shallow furrows two feet apart, then buries the manure by two side furrows, and harrows the ground level, lengthwise of the furrows. This method requires less manure, and he has the advantage of hoeing the turnips in drills.'

We recollect, likewise, that we have read in several of our New England newspapers, that fine turnips have been raised by ploughing up old sward ground some time in June, harrowing well, and sowing from the 1st to the 20th of July, and this without the application of manure. But there can be no doubt that folding sheep or horned cattle on the land thus ploughed would very much enhance the crop.

All American writers on this subject, whose works we have perused, advise to sow seed of the common English turnip as late as about the middle of July. They tell us that late sowed turnips are much the best for the table, and that they are less liable to be injured by insects, if sown so late, than when sown much earlier in the season.

Turnips are frequently, if not most generally, raised in the United States as a second crop, and no doubt this practice is often very eligible and may be perfectly consonant with the soundest maxims of good husbandry. But when it is intended to *make the most of your crop of turnips*, or to obtain as great a product as possible for the purpose of feeding cattle, we do not perceive any objection to giving turnips a larger portion of the season to grow in than has been with us the general practice.

An English writer on agriculture, whose remarks on this and other agricultural topics appear to us to be judicious, and to display a thorough knowledge of the subjects of his essays, says, 'It is not pretended that there lies any solid objections to early sowing of turnips, simply considered; on the contrary, such seems to be the most proper means of obtaining a full crop; but the advantages of early sowing, whatever they be, are given up, and the season postponed from near three to five months by way of retarding the growth of the crop, that it may last to a later period in the spring, and receive less damage from the frosts than that to which it would be liable in its early maturity. The disadvantages attending this plan are a crop far inferior in weight to what might be obtained from the land; the very common risk of destruction from drought and fly. The weight and perfection of the turnips being the objects, the land may be got ready for them as for any other early spring crop, and the seed sown with the first warm showers. This will afford ample scope for resowing, should the first seed fail, of which, however, granting it to be good, and the land sufficiently fine, I believe there is scarcely any risk.'

'As to any advantages of a crop previous to the turnips, nothing scarcely can stand in competition with the first crop of roots.

'The true turnip soil is a deep sand or sandy loam. Every gardener knows the proper time to begin hoeing turnips. In general, when the plants spread a circle of about four inches they are ready for the first hoeing. They are commonly left about a foot asunder. The second hoeing three weeks after the first.'

Those who desire to go extensively and successfully into the turnip culture should raise their own seed from the finest transplanted roots. An English cultivator says, 'It is wonderful what a small quantity of seed suffices for an acre of ground, and indeed equally so how it can be delivered and spread over such a breadth. A pint might be more than enough, but it is usual to broad-cast a quart on an acre.'

Dr. Deane's New England Farmer asserts that 'the quantity of seed sown on an acre is never less than one pound, frequently a pound and a half, and by some two. According to the same work it is very necessary for the success of the crop that a heavy roller be passed over the field immediately after harrowing in the seed, provided the ground is sufficiently dry, or as soon as it is in a fit condition. By this means the clods are broken, and much of the seed that would otherwise be exposed to birds, &c. will be covered and the surface rendered smooth and compact thereby, and consequently more retentive of moisture, which will greatly promote the vegetation of the seed and growth of the plants.

If a quantity of lime were sowed over the field immediately after putting in the seed, it would probably preserve the crop against insects and prevent the turnips becoming spongy, as well as increase their size. Unleached ashes, soot, and plaster, have also been highly recommended as manure for turnips. Thomas Mellville, Jun. Esq., of Pittsfield, Massachusetts, in raising a crop which received the premium from the Massachusetts Agricultural society in 1817, and which amounted to about seven hundred and fifty bushels to the acre, sowed his seeds in drills of twenty-eight inches the 21st of June, on ground previously well manured. The following day sowed on the acre thirty bushels slacked lime and fifteen bushels house ashes.

What we have said about the *early* sowing of turnips we would merely suggest as a hint, or something to be thought of, and perhaps become a matter of experiment. It appears to us that our custom of sowing turnips so late in the season as is commonly practised, is an usage borrowed from British husbandry without duly considering the difference of our climate from that of Great Britain, and the different uses to which this crop is commonly applied in the two countries. In England they usually feed turnips off the ground with sheep; or draw them for neat cattle during the winter as fast as they are wanted, and often let them stand in the field till spring, to supply green food for sheep at the time of their yeaning, &c. But in the United States, this crop must be harvested in autumn and secured from frost; and it would seem to be desirable that they should have had time to obtain their full growth before they are gathered.

'Ellis, an old writer on husbandry, says, "Turnips sooted about twenty-four hours after they are up will be entirely secured from the fly." Some advise, and it may be well, if not too much trouble, to leach soot and sprinkle the young turnips with the liquor. M'Mahon, in treating of the cultivation of turnips, says, "the plants should be left from seven to twelve inches every way; this must be regulated according to the strength of the land, the time of sowing, and the kind of turnips cultivated; strong ground and early sowing always producing the largest roots."

'The width of the hoe should be in proportion to the medium distance to be left between the plants, and this to their expected size.

'The critical time of the first hoeing is, when the plants, as they lie spread on the ground, are nearly the size of the palm of the hand; if, however, seed-weeds be numerous and luxuriant, they ought to be checked before the turnip plants arrive at that size; lest, being drawn up tall and slender, they should acquire a weak and sickly habit.

'A second hoeing should be given when the leaves are grown to the height of eight or nine inches, in order to destroy weeds, loosen the earth, and finally to regulate the plants; a third, if found necessary, may be given at any subsequent period.

'Here will the farmer exclaim against the expense and trouble of hoeing; but let him try one acre in this way, and leave another of the same quality to nature, as is too frequently done, and he will find that the extra produce of the hoed acre will more than compensate for the labor bestowed.

'Loudon says archbishop Garrie, a Scottish gardener of merit, tried steeping the seed in sulphur, sowing soot, ashes, and sea-sand along the drills, all without effect. At last he tried dusting the rows, when the plants were in the seed-leaf, with quicklime, and found that effectual in preventing the depredations of the fly. " A bushel of quicktime," he says, " is sufficient to dust over an acre of drilled turnips, and a boy may soon be taught to lay it on almost as fast as he could walk along the drills. If the seminal leaves are powdered in the slightest degree, it is sufficient; but should the rain wash the lime off before the turnips are in the rough leaf, it may be necessary to repeat the operation, if the fly begins to make its appearance."'

POTATOES. Above two hundred and forty years have elapsed since the introduction of the potato into the British isles. During that period, it has been gradually making its way in the favor of the inhabitants; but its progress for a long time was very limited. So slight, indeed, was the estimation in which it was held, even after the era of the revolution, that we find the celebrated Evelyn, in the year 1699, giving directions to plant potatoes in the worst grounds. 'Take them up,' he says, 'in November, for winter spending; there will enough remain for a stock, though they be ever so exactly gathered.'

The potato began however to be extensively cultivated about the middle of the last century; and now it is grown in every farm and cottage garden, almost without exception.

If experience seemed to have proved beyond a doubt that this root may be deemed one of the most important vegetable productions; if, in the face of every assertion to the contrary, it be found a very valuable and, generally speaking, a most salubrious article* of diet, and admirably adapted to supply nutritious food for animals and poultry; it becomes a serious interest to determine with certainty that mode of culture which shall at all times, and in all situations, tend to produce the heaviest crops, and of the finest quality.

* It has been argued that the potato, at least under certain conditions, possesses a slightly poisonous quality. The idea may have originated in the botanic character of the plant; in fact, it is one of the family of the nightshade, the *solanum tuberosum* of Linnæus, and of the old natural order *luridæ*, which included plants whose appearance was described as being 'dusky, dismal, and gloomy.' The genus or family *solanum* is the type of that numerous tribe or order in the *natural* system, *solanea*, many of whose members exhibit great beauty of appearance and possess very useful properties.

The common mode of planting and cultivating the potato is known to every cottager and farming man; but that philosophic method which has recently been productive of enormous returns, may, perhaps, be referred chiefly, if not entirely, to the scientific president of the Horticultural society. This method it is my object to describe, through the medium of your pages; but before I enter upon the detail of Mr. Knight's directions, I think it a duty to request the reader's attention to a few important results, the particulars of which have been stated to me in letters lately received from that gentleman. As facts, and very recent ones, they are peculiarly interesting, not only as they decisively show what may be, and has been effected during the late season, but also because they prove, to a demonstration, that science and hypothesis may go hand in hand with practice; and that, when the latter is founded upon the former, it loses altogether its empirical character, and becomes established upon the most unassailable basis.

Mr. Knight has observed, that he planted his potatoes upon a soil *naturally poor* and very shallow, upon a rock full of fissures, *giving no more manure than is usually given to a crop of turnips;* the manure was mixed up with the soil, and not thrown into the drills at the time of planting. The plants suffered from drought during a part of the year; nevertheless, he had very good crops from many varieties. These varieties he had himself originated from seed, and they possess the important quality of *scarcely producing any blossoms;* and therefore the vital powers of the plant are entirely employed in the production and support of those tuberous processes, the potatoes, which are the sole object of the cultivator. The produce of two of the sorts is particularly stated to me, and is as follows: of the one, twenty-three tons two hundred weight seventy-six pounds; and the other, twenty tons two hundred weight one hundred and one pounds, per acre. Of four other varieties he observes, 'the produce exceeded twenty tons each per acre, all of good quality.' If the reader will reduce these weights to pounds, he will find them (reckoning the yield at twenty tons only per acre) to amount to five hundred and sixty bushels, each of eighty pounds weight.

In the winter of 1831, I received a packet from Mr. Knight, inclosing several specimen potatoes raised by him. For the convenience of carriage, these were under the medium size, weighing about four ounces each; they were, however, perfect in form and growth. Eight of them were selected and planted in a row, each widely apart one from the other. From these eight tubers, whose total weight was barely two pounds, I obtained a produce of one hundred and fifty-six potatoes, weighing, in all, sixty-nine pounds. Some roots yielded more than others; one was peculiarly prolific;—it furnished eighteen pounds of potatoes, six of the largest of which weighed ten pounds.

Having thus adduced a few general facts, it remains to point out the mode of operation by which such large results may be obtained.

One of the chief, if not the primary, agent in effecting vegetable development and maturity, is light. Deprive a plant of *that*, and you either paralyze the operation of its vital principle, or induce imperfect and diseased action. The leaves of vegetables are the media upon which light acts; and, therefore, it should be the object of the gardener so to arrange his crops, that the utmost breadth of their foliage may be exposed to the full influence of the solar rays. Hence, the rows of potatoes ought to *point north and south;* for, in the first place, plants so exposed command the greatest breadth and duration of light; and in the second, the sun at the time of his highest meridian altitude, that is, at the hour of noon, shines directly along the extent of the rows; his light is also most equally distributed upon the whole foliage as he approaches to and recedes from the meridian. The perpendicularity of growth, which is of considerable importance to the complete success of the crop, is less likely to be disturbed by this mode of arrangement, than by any other that has heretofore been employed. It is generally the practice to plant small potatoes, or sets of large tubers, cut with one or two eyes to each. These sets are planted in rows from sixteen to twenty inches asunder, and the sets about half that distance, or nine inches apart, without any consideration being had to the aspect or direction of the rows. As the stems advance in growth, they are very liable to fall over and become entangled one with another, thus intercepting the solar light, which then acts unequally upon the disorderly masses of foliage. Hence the crops become very unequal in point of bulk and weight.

Mr. Knight's philosophical directions lead to a very different result. He recommends the planting of whole potatoes, and those only which are of fine medium size, none to be of less weight than four ounces; and he often prefers those which weigh six or eight ounces. The earlier sorts, and, indeed, all which seldom attain a greater height than two feet, are to be planted about four or five inches apart in the rows, centre from centre, the crown ends upward; the rows to be from two feet six inches to three feet asunder. The late potatoes, which produce a haulm above three feet in height, are to be placed five or six inches apart, centre from centre, in rows four or five feet asunder.

When potatoes are thus planted in rows pointing north and south, the utmost energy of the light will be exerted, not only upon the foliage of the plant, but upon the surface of the intervening spaces of ground. If we suppose that the main crops will be planted at the latter end of March and during the month of April, the sun's meridional altitude will be advancing daily for at least nine weeks; and during that period, the development and growth of the stem and leaves will be in a state of rapid progress. After the turn of days, and when the plants have attained their full growth, the sun will continue to exert its most powerful influence. Should the ground be of a proper texture and quality, the plants will stand erect, and the maturing process will proceed without interruption; and after favorable summers, wherein there have been regular and moderate supplies of rain, particularly during May and June, with a prevalence, however, of bright sunshine, the crops of potatoes will be regular, the tubers generally of a medium size, and the quality mealy, and altogether superior. If the soil be a strong mellow loam, enriched with much manure, the haulm will, in all probability, grow too rank, and finally fall over; nevertheless the large spaces between the rows will greatly remedy this evil, for the sun's beams will act upon one surface at the least, and the matting and other injurious consequences resulting from close drilling will be prevented or obviated. I cannot refrain, in this place, from correcting an erroneous opinion, which almost universally prevails. We hear everywhere of potato plants running away to haulm, and thus expending their vital energy upon useless stem and foliage, instead of employing it in the production of tuberous roots. Now this remark is wholly opposed to philosophical fact, for invariably the strongest and heaviest bulk of potatoes is found attached to the most luxuriant haulm. The evil of over-luxuriance is not to be referred to the paucity of tuberous product, for that is always great; it is a consequence of an over-rich soil, which causes the haulm to grow so tall as to fall over, become entangled, and thus to lose the maturing influence of light. Hence, such haulm seldom ripens in due time; it remains green even in December; and the tubers, though large, numerous, and heavy, are immature, void of mealiness, and vapid in flavor.

A fact of great importance to the growers of potatoes remains to be noticed. The *outside rows*, and all *single rows*, will be found to produce far greater crops than any of the interior rows of a plot in the garden or field. This depends upon a variety of causes, the chief of which is, the more perfect exposure of the foliage to the agency of air and light. Mr. Knight assures me, that he obtained from one outside row of an early seedling variety of the preceding year, which was two feet six inches exterior of an adjoining row, '*a produce equivalent to more than fifty-eight tons per acre.* No conclusions,' he adds, 'can be drawn from the amount of produce of an external row. I mention it only to show *the enormous influence of light.*'

In this philosophical remark I cordially acquiesce, because experience has established its truth to my own satisfaction. I therefore earnestly recommend every cultivator, who has the opportunity of cropping upon long detached slips, in airy, open situations, to make the experiment of close planting in single rows, either whole potatoes or well-cut sets from very large potatoes, each to contain two eyes at the least. These sets should be taken from the crown end, or middle of the tuber, and not from the lower or root end; as I have found the latter to be comparatively unproductive. Sets may be planted at still less distances in the rows than whole tubers; and although the preference ought, in all cases, to be given to a southern direction, where such can be conveniently given, still, for absolutely single rows, it is not indispensably required, because air and light will act on each side of the stem and foliage, and there will be no intervening shadow.

The *soil* ought to be sandy and light, though moderately rich; that is, if fine mealy and dry potatoes be required. It should not by any means be glutted with manure, and need not be deep. I have found no particular advantage in trenching for this crop; in fact, I am credibly informed by an observant gentleman, who has travelled extensively, that in North America, the finest potatoes are produced in extraordinary quantities upon grass meadows, by simply turning up the turf by placing the grass surface downward upon them.

With respect to the properties of this vegetable and the purposes to which it may be applied, the following observations of an eminent physician may not be deemed inappropriate. I extract them from the 'Pharmacologia of Dr. Pare.

'Potatoes are found to produce,

First, Cottony flax from the stalk.

Second, Sugar from the root.

Third, Potass by consumption.

Fourth, Vinegar from the apples.

Fifth, Soap, or a substitute for bleaching, from the tubercles.

And, finally, when cooked by steam, the most farinaceous and economical of all vegetable food.'

It is also known that much farina, or rather *amylum*, or starch, is yielded by grinding and washing the pulpy mass. My experiments in 1828 led me to ascertain, that a fine, mealy sort yielded from one-eighth to one-seventh of the total weight of the potatoes. This starch may be employed as a substitute for that made from wheat; and as an article of diet, prepared as Indian arrow-root. It can also be introduced in making bread, though there is some difficulty in the manipulation. As food for all cattle of the farm—horses, cows, pigs, and likewise for poultry, potatoes are all but invaluable. Every creature appears to relish them, particularly when they are steamed or carefully boiled. It would be well worth the intelligent farmer's while to pay great attention to the use and effects of potatoes, raw and boiled. It is asserted that a cow may safely eat them in a raw state to the extent of, perhaps, fifty pounds per day, provided the eyes have broken and began to shoot. Whenever they be given raw, however, they should be chopped into pieces to prevent accidents. The utility of raw potatoes is, however, doubted by many, and therefore the experiment requires close observation; perhaps straw, hay, and chaff, might be employed as a very proper adjunct, with a few ounces of salt added to each feed. Whenever steaming in the large way can be profitably employed, it must be an advantage for pigs and poultry particularly; and, in all cases, it would greatly tend to prevent the possibility of the danger of suffocation which has been known to result from the hurry and greediness with which cattle devour the raw roots. —*British Farmer's Magazine.*

Potatoes renewed from Seed. 'Take the apples in the beginning of October [or whenever they are ripe] before the frost has hurt them; hang them up by the foot stalks in a dry closet, where they will not freeze; let them hang till March or April; then mash the apples, wash the seeds from the pulp, and dry them in a sunny window. Sow the seeds in a bed, about the first of May. When the plants are four or five inches high, transplant them into ground well prepared, one or two plants in a hill. They will produce full grown apples, and some of the roots will be as large as hen's eggs. But if the seeds were sown in autumn, some of them would come up in the following spring. Nothing is more common than their appearance in fields where potatoes have been raised the preceding year.'

The process stated in '*Monk's Agricultural Dictionary*,' an English work, is similar to that mentioned by Dr. Deane, excepting that it is recommended in that work to hang the apples of the potatoes in a warm room till Christmas. Then wash out the seeds, spread and dry them in paper, and preserve them from damps till spring.'

Potatoes thus obtained will produce roots of the full size the second season after sowing, when their qualities may be more fully ascertained than they could well be the first season. They will be found to vary very much from the kinds, from which the apples were gathered. It will be expedient to plant but one potato of the regenerated sorts in a hill, that you may keep each variety separate. Then, by keeping the produce of each hill by itself, and boiling one or two of each, you may ascertain which is best for the table: and by observing the quantity of produce in each hill, you may form a pretty good estimate relative to the productiveness of each sort. In that way you may introduce new varieties of potatoes, and supply yourself and neighbors, and eventually the market, with potatoes of a quality much superior to any of the worn out and degenerate kinds which are now to be found. The subject is of importance, and the man who will introduce new and improved sorts of potatoes, will deserve but little less of his country than he who improves our breeds of domestic animals.

COTTON. (*Gossypium.*) There are many varieties of this plant, all of which are natives of warm climates, but only four are cultivated. In Georgia and South Carolina two kinds are planted. One grows on the upland, has a short staple, with green seed. Another has black seed, and is cultivated on the islands near the coast.

Pierce Butler, Esq. a successful cultivator, has given the following directions for raising this article:

'If the land has been recently cleared, or has long remained fallow, turn it up deep in winter; and in the first week in March bed it up in the following manner: Form twenty-five beds in one hundred and five square feet of land; (being the space alloted to each laborer for a day's work;) this leaves about four feet two and one half inches from the centre of one bed to the centre of the next. The beds should be three feet wide, flat in the middle. About the 15th of March, in latitude from twenty-nine to thirty degrees, the cultivator should commence sowing, or, as it is generally termed, planting. The seed should be well scattered in open trenches, made in the centre of the beds, and covered. The proportion of seed is one bushel to one acre; this allows for accidents occasioned by worms or night chills. The cotton should be well weeded by hoes once every twelve days till blown, and even longer if there is grass, observing to hoe up, that is, *to* the cotton, till it pods, and hoe down when the cotton is blown, in order to check the growth of the plant. From the proportion of seed mentioned, the cotton plants will come up plentifully, too much so to suffer all to remain. They should be thinned moderately at each hoeing. When the plants have got strength and growth, which may be about the third hoeing, to disregard worms and bear drought, they should be thinned, according to the fertility of the soil, from six inches to near two feet between the stocks or plants. In rich river grounds, the beds should be from five to six feet apart, measuring from centre to centre; and the cotton plants, when out of the way of the worms, from two to three feet apart. It is advisable to top cotton once or twice in low grounds, and also to remove the suckers. The latter end of July is generally considered a proper time for topping. Gypsum may be used with success on cotton lands *not near the sea.* In river grounds draining is proper; yet these lands should not be kept too dry. In tide lands it is beneficial to let the water flow over the land without retaining it. In river lands a change of crops is necessary. From actual experiment it has been proved that river tide lands, having the preceding year had rice sown on them, yielded much more cotton the succeeding year than they would have afforded by a continuation of cotton.

The mere growing of cotton is but a part of the care of the planter; very much depends on classing and cleansing it for market, after it has been housed. Sorting it before it goes to the jennies, moteing and removing any yellow particles, are essential to assure a preference at a common market of competition.

TOBACCO. (*Nicotiana.*) This plant is named from Tobago, one of the Caribbee islands. It was first introduced into England by the famous Sir Walter Raleigh, and from thence it spread over the other parts of Europe.

In order to raise the young plants it is recommended to burn over the surface of a piece of ground early in the spring, rake it well, and sow the seeds. When the plants have acquired leaves the size of a quarter of a dollar they are fit for transplanting. They require a dry, light, rich soil, made mellow by ploughing, and folding is also advised. Dr. Deane observed that 'the common way of raising tobacco in cow-pens and barn-yards is detestable. The taste of such tobacco is intolerable. Transplant the young seedlings when the ground is wet, as you would cabbage plants. Set them about three and a half feet apart, and weed them as you would growing cabbages. Destroy the large green worms, which are apt to infest this crop.

When the plants have grown about three feet high, a little less or more, as they may be more or less thrifty, their tops should be broken or cut off, excepting those designed for seed, which should be the largest. The tops should be taken off so early in the summer as to allow time for the upper leaves to grow to the same size as the lower ones. Of this time the cultivator must judge from circumstances, previous observations, or the advice of some person accustomed to raising tobacco. All the plants should be topped at the same time, whatever may be their height, that they may ripen together, and produce leaves nearly of the same size and thickness. The suckers which shoot out from the foot stalks of the leaves should also be broken or pinched off as fast as they appear.

The ripeness of tobacco is known by small dusky spots appearing on the leaves. The plants should then be cut near the roots, on the morning of a day of sunshine, and should lie singly to wither. When sufficiently withered the plants should be laid in close heaps under cover to sweat forty-eight hours or more. After this they should be hung up under cover to dry. This may be done by running two stalks on the sharp ends of a stick about eight inches long, and suspending them across a pole about sixteen incnes apart, in a pretty tight apartment. As the plants become dry they may be placed nearer to each other, to make room for more, if necessary. When they have hung till there is no greenness in the leaves, and at a time when the air is damp, the leaves should be stripped off the stalks, tied up in hands, and packed away in chests or casks, well pressed down, and kept in a dry place, not in a cellar, which would soon spoil the tobacco.

The use of tobacco for chewing and snuffing is uncleanly, unwholesome, and becoming unfashionable with the more respectable parts of the community. The habit of chewing it, however, is not easily broken. A writer for the *National Intelligencer*, with the signature 'J. B.,' states, in substance, that he was suffering under a pulmonary complaint supposed to be brought on by chewing tobacco, and that by making a substitute of *slippery elm bark*, and swallowing the juice, he at once got rid of his disorder and his propensity to chew this poisonous plant. The dust or powder of tobacco, thrown over beds where plants are just coming up, preserves them from worms. It is said, also, that a few tobacco plants set out among cabbages and turnips, the tobacco plants about one rod apart, will save the cabbages and turnips from insects.

M. M'Louvin, in Loudon's Magazine, observes as follows: 'I procure from the tobacconists a liquor expressed from tobacco, to every gallon of which I add five gallons of water; this mixture, with Read's garden syringe, I sprinkle over the trees, putting it on the finest rose, and being careful to wet all the leaves; this operation is performed only in the hottest sunshine, as the effect is then much greater than when the weather is dull. In this manner I have this spring, with five gallons of liquor, reduced as above stated, cleaned seventeen peach and nectarine trees, twelve of which average seventeen feet in length and twelve in height. The black glutinous insect, provincially called blight, so destructive to the cherry trees, is destroyed in the same way with equal facility. I have also found that the grubs which attack the apricot may be destroyed almost instantly by immersing the leaves infested in this liquor.

'When trees have got so bad that their leaves are much curled, some of the flies, being protected within the curl, will escape: in this case more force must be applied to the syringe, and in a day or two the trees should be looked over again, and whatever part of the leaves has not been wetted should be washed with a painter's brush; but a careful person will render this process unnecessary by taking them in time.'

Instead of liquor from the tobacconist, which may not always and in all situations be easily procured, a strong decoction of the stems or damaged leaves may be a cheap substitute. The uses of tobacco in destroying lice on cattle, ticks on sheep, &c. are too well known to render it necessary to make any observations on this application of a plant which seems to be abhorred by every animated being but man and the tobacco worm. But a quantity of tobacco ought to be grown by every cultivator, to enable him to wage successful war with insects.

PLOUGHING, is the most important of agricultural operations. On the manner in which this is performed depends all the subsequent operations of tillage on the same land. A large volume might well be written on this subject, but we shall confine ourselves to practical hints, expressed as concisely as is consistent with perspicuity.

In all stiff, heavy, and adhesive soils, that are much disposed to moisture, it should be a common rule not to plough them while wet in any considerable degree, especially if there is much clay in their composition. When such land is ploughed wet, the particles of which it is composed are apt to cake, or run together into hard lumps, which require much trouble and labor to reduce to a fine state. Besides, much injury is produced by the treading of the team, and greater power is necessary in performing the operation. But, on the other hand, such soils are ploughed with much difficulty when very dry; unless before the ploughing they were in a state of tillage, and not baked or bound down very hard. To break up grass ground composed of a strong loam, or a soil in which there is clay in any considerable quantity, when in a dry state, is next to impossible. You might almost as well attempt to plough up a brick pavement or slate rock. Green sward in general can hardly be ploughed too wet, if it be not miry. Marshy, moory, and peaty or mossy descriptions of soil should in general, when already reduced to a state of tillage, be ploughed when the season is dry.

In dry, sandy, and perhaps in some of the more mellow kinds of loamy soils, the business of ploughing may be performed when the earth is in a state of considerable moisture. But very dry sandy land, whenever the weather is hot and dry, should merely be stirred in such a way as may be necessary to prevent the growth of weeds; otherwise the great exhalation of moisture in such seasons may render them too dry for the vigorous vegetation of the seeds or plants which may be sown or growing upon them. The cultivators of this kind of soil have, therefore, many advantages over others who are engaged in the more stiff and heavy sorts of land, in being able to perform the various operations of arable husbandry with much less strength and expense of team, and by being much less interrupted by the wetness of the seasons. Stiff clayey soils, which are already under the plough, may be beneficially ploughed in dry weather, and it is said that stirring such soils in a dry season causes them to imbibe moisture, but in sandy soils the opposite result is produced by the same means.

It is very fashionable, and, as a general rule, very correct to recommend deep ploughing. But this rule has a great many exceptions, and the cultivator who should be governed by it without regard to the nature of the soil and the proposed crops, would only labor hard to injure his land and reduce his products.

It may not be amiss to attend to what some writers have observed respecting the dangers and disadvantages which attend ploughing deep without regard to the nature of the soil and other circumstances. It is observed in Dickson's Agriculture, that 'though deep ploughing has been recommended by some modern writers upon particular kinds of land, where the bottom and top were of two opposite qualities, and neither of them perfectly good, that a mixture may sometimes be very beneficial, and the experiment of going below the common depth sometimes answer; but that when the top and bottom for eighteen or twenty inches depth consists of the same soil, it is not believed it is ever worth while to exchange the upper part, which has been enriched for centuries back, for a part less rich, merely because it is more fresh. On retentive soils, where the practice of loosening them to some depth by other implements is omitted, deep ploughing is however extremely necessary.'

In an 'Essay on the best means of converting Grass Lands into Tillage, by James Roper Head, Esq.,' published in *Communications to the Board of Agriculture*, vol. iii. page 346, it is observed that 'it seems reasonable to prefer light to heavy ploughing, because, all things being equal, it must be preferable to have a small depth of soil to cultivate and improve; and inasmuch as the fibres of grass in general are fed from the upper surface of the earth alone, if they find sufficient pabulum, all that lie underneath their nourishment, and has been with much labor moved by the plough, is like a stock in trade, which requires an extra capital, unproductive of interest.

'I have endeavored by all means to search into the nature of sainfoin, clover, and lucerne, and the result of my opinion has been that the long penetrating tap-roots of these grasses pierce the earth in search of moisture only; that the tap-root is the mere syphon and duct; that the branches of the crown of the plant are fed alone by the upper surface of the soil; and that the luxuriancy of their produce depends not upon the congeniality of the bed or *nidus* [nest] of the tap-root itself, but on the congeniality of the soil of the upper surface, which alone feeds and furnishes it vegetation.'

An article in 'Communications to the Board of Agriculture,' vol. iv. page 147, written by John M. Mardo, Esq., contains the following statement: 'We have witnessed instances where old pasture lands composed of a gravelly loam were broken up in the spring for barley by trench ploughing. The old sward was turned into the bottom of the furrow, and a dry subsoil brought to the surface from a considerable depth. The crops failed entirely, and there appeared two very obvious reasons for the failure; first, the subsoil brought to the surface to form the seed bed had long been deprived of the ordinary influence of the atmosphere and the rains; consequently must have been cold and infertile. Secondly, the dry tenacious sward having been placed half broken under the seed bed, the natural moisture of the ground, as well as that which falls in rain, was speedily and habitually evaporated. Unless in a season of uncommon moisture, a crop under such preparation could not prosper.'

A writer in the General Report of Scotland, Mr. James

Brownhill, says 'Old leas, [grass grounds,] in my opinion, should be ploughed if possible not above four and a half inches deep by eight and a half or nine inches broad. If the old lea be a dry soil, it will plough very well with those dimensions; if it be ploughed deeper it must also be ploughed broader, as the furrows will not ply close to one another, unless you have breadth in proportion to the depth.'

Sir John Sinclair speaks highly of the advantages of deep ploughing in some circumstances and for some crops, but says 'it is a general rule never to plough so deep as to penetrate below the soil that was formerly manured and cultivated excepting upon fallow, and then only when you have plenty of lime or dung to add to and improve the new soil.' The farmers of Flanders, which is said to be the best cultivated part of Europe, gradually deepen their soil by ploughing or digging up fresh earth as their manure increases. Mr. Arthur Young likewise observes that in poor hungry soils some proportion ought to be observed between the depth of a ploughing and the quantity of manure annually spread. The same writer informs us that the depth of ploughing in various towns of England, on an average, in sandy soils, was four inches; in loamy soils four and three quarters, and in clayey soils three inches and a half.

Disputes have arisen among farmers in this country and in Europe relative to the best manner of laying the furrow slice. Some contend for turning the furrow slice completely over, and laying it quite flat; but others allege that it is most advantageous to place each slice in such a manner that its outer edge may extend a little over the inner edge of the furrow which was drawn next before it. 'In several districts in England it is usual to lay the furrow slice quite flat, and this is particularly the case where there are no ridges; but in Northumberland, and in Scotland, a contrary system is adopted. It is founded on this idea, that as two of the principal objects in ploughing are, to expose as much as possible to the influence of the atmosphere, and to lay the land, so that the harrows may, in the most effectual manner, raise mould to cover the seed; these objects are most effectually accomplished by ploughing land of every description with a furrow slice about seven inches deep, and which, if about ten inches and a half broad, raises the furrow slice, with a proper shoulder, forming the angle forty-five, the point which ought to be referred to when determining between the merits of different specimens of ploughing. For that purpose, the depth of the furrow should, in general, bear a due proportion to the breadth, that is, about two-thirds, or as six inches deep is to nine broad. This is the general, if not the universal opinion of the Scotch farmers.'* The angle forty-five is strongly recommended in Bayley's Essay on the Construction of the Plough, in his Durham Report, and in Brown's Treatise on Rural Affairs. In the southern counties of England, however, they generally prefer to turn the furrow quite flat, or horizontal; and allege as a reason for that practice that the weeds, grass, &c. ploughed under cannot well be smothered or withered unless the roots are turned completely bottom upwards, and the turf covered so closely as to have no communication with the atmosphere.

In Flanders, land is frequently cultivated by an implement called the *binot*, which is highly esteemed. By this instrument the land is not turned over, as by the plough, and the weeds buried; but the soil is elevated and pressed into small ridges, and thus is better exposed to the beneficial influence of the winter frosts, and becomes much sooner dry in spring than when the land is turned over perfectly flat. When furrow slices are set up edgewise by a plough, they become small thin ridges, are more easily pervaded by frost, and are in a situation to attract more of the fertilizing influences of the atmosphere, than when they are turned over so as to lie in a horizontal position. Perhaps this mode of ploughing land may be advantageous in stiff, hard soils, where several ploughings are necessary to prepare for the reception of the seed. If land of this description is broken up in the fall or summer preceding the sowing or planting of the seed, and cross ploughing in the spring is made use of, preparatory to putting in the seed, we are inclined to think that the 'feather edged ploughing,' as it is sometimes called, (in which the furrow slices are not laid so flat as to exclude the air from between and from the lower part of the furrow slices,) is to be preferred. 'Ploughing previous to winter setting in is of great use to clays, or stiff lands, exposing the surface to the frost, which mellows and reduces it in a manner infinitely superior to what could be accomplished by all the operations of man.'† If, then, exposing the surface of stiff soils to the frost is of great advantage, the more surface there is exposed

* Code of Agriculture.

† See Husbandry of Scotland, vol. i. p. 229, and vol. xi, Appendix, p. 26.

the greater the advantage; and if the furrow slices are set partly or entirely on their edges there will be, as before intimated, more surface exposed than there would be if they were laid perfectly flat. And if they were turned in such a manner as to form an angle of forty-five degrees, the outer edge of the furrow resting on the inner edge of that which immediately preceded it, there would be but little chance for the weeds or grass to grow up between the furrows, which may be the case when the slices are set perpendicularly, or nearly so, on their edges. There will likewise always be a cavity under the edges of the furrow slices, containing stagnant and sometimes putrescent air, which will enrich the soil. Moreover if ridge-ploughing is at all advantageous, we cannot see why a mode of ploughing which makes a ridge of every furrow slice, or at most a ridge by turning the edge of one furrow slice on the edge of its immediate predecessor, should not be likewise of advantage. Besides, by these modes of ploughing you form a covered or open drain or hollow place between the furrows, which, by carrying off superfluous water, will render the soil fit for tillage earlier in the spring than would be possible if every furrow slice was laid flat as it was turned upside down. The harrow will also more readily take hold of a soil where the furrow slices form little ridges or protuberances, and thus a proper mould will be procured for the covering of the seeds, or earthing up plants in a growing crop. And if there is danger of the lands lying too loose and hollow, repeated harrowing, and rolling it with a heavy roller after sowing, will furnish a remedy.

Dry sandy soils, such as ought *not* to be ploughed in ridges, should be turned over completely, and be laid and kept level as possible. Such soils, if rendered loose, and laid light by cultivation, will be robbed of their fertilizing particles as well by rain as by sunshine. In other words, they are liable to suffer by washing, by scorching, and by too much draining. They do not need to be made any lighter, by 'feather edged ploughing,' or setting the furrow slices edgewise, being too light under ordinary cultivation. It is therefore 'a great advantage to such soils to fold sheep, or to consume the crops of turnips upon the ground where they are raised. These practices greatly contribute to the improvement of such soils, not only by the dung and urine thus deposited, but by the *consolidation and firmness of texture* which the treading of sheep occasions.'*

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* Code of Agriculture.

On the whole, although it would not be possible to give general rules not liable to many exceptions, on the shape and position of the furrow slice, which should be cut and disposed of according to the views of the cultivator, the nature of the ground, the proposed crop, &c., we are inclined to believe that Sir John Sinclair's maxim will apply to most of our New England uplands. That eminent agriculturist says that 'the point which ought to be referred to, when determining between the merits of different specimens of ploughing, is the angle of forty-five degrees.' That is, other things being equal, the nearer the furrow slice comes to forming an angle of forty-five degrees with the horizon, the more perfect the specimen of ploughing. But another maxim of the same writer is equally worthy of attention. 'Dry soils being deficient in moisture *ought to be tilled flat*, as any sort of drainings which the furrows might afford would be prejudicial rather than advantageous. In Kent, dry land is left as level as if it were dug with a spade. The moisture is thus equally diffused and retained under the surface of the earth.'

The following is extracted and abridged from an address delivered before the Middlesex Society of Husbandmen and Manufacturers; by Elias Phinney, Esq.

'In May, 1829, the field having lain three years to grass, and the crop of hay so light as to be worth not more than the expense of making, with a view of ascertaining the quantity of vegetable matter upon the surface, I took a single foot square of green sward, and after separating the roots and tops of the grasses from the loam and vegetable mould, it was found on weighing to contain nine ounces of clear vegetable substance, giving, at that rate, over twelve and a quarter tons to the acre. This convinced me of the importance of taking some course by which this valuable treasure might be turned to good account. That a great part of this mass of vegetable matter is exposed to useless waste, by the usual mode of ploughing, cross ploughing and harrowing, must be obvious to any one. In order therefore to secure this, as well as the light vegetable mould at and near the surface, which is liable to waste from the same causes, I had two acres of the green sward of this field turned over with the plough, as smoothly as possible. After removing the outside furrow slices into the centre of the plough land, and thereby effecting the double purpose of covering the vacant space in the middle and preventing ridges at the sides and ends, the field was rolled hard, with a loaded roller, by which the uneven parts of the furrow were pressed down and the whole made smooth. It was then harrowed lengthwise the furrows, with a horse harrow, but so lightly as not to disturb the sod. Twenty cart-loads of compost manure, made by mixing two parts of loam or peat mud with one of stable dung, were then spread upon each acre. It was then harrowed again, as before, and the poorer part of the soil, which had been turned up, and remained upon the surface, was thereby mixed with the compost manure. Corn was then planted in drills upon the furrow, the rows being at the usual distance and parallel with the furrows. At hoeing time, the surface was stirred by running a light plough between the rows, but not so deep at this or the subsequent hoeing as to disturb the sod. What Mr. Lorrain calls the 'savage practice' of hilling up the corn was cautiously avoided. As the season advanced, I carefully watched the progress of my corn-field. In the early part of the season it did not exhibit a very promising appearance; but as soon as the roots had extended into the enriching matter beneath, and began to expand in the decomposing sward, which had now become mellow, and more minutely divided by the fermentation of the confined vegetable substances beneath than it possibly could have been by plough or hoe, the growth became vigorous, and the crop, in the opinion of those who examined the field, not less than seventy bushels of corn to the acre. As soon as the corn was harvested, the stubble was loosened up by running a light horse plough lengthwise through the rows, the surface then smoothed with a bush-harrow, and one bushel of rye, with a sufficient quantity of herd's grass and red top seed, to the acre was then sowed, the ground again harrowed and rolled. The crop of rye was harvested in July following, and the two acres yielded sixty-nine and a half bushels of excellent grain, and over five tons of straw. The grass sowed with the rye took well, and the present season I mowed, what those who secured the crop judged to be, two and a half tons of the very best of hay from each acre.

'Thus, with one ploughing, with the aid of twenty cart-loads of compost manure to the acre, I have obtained two crops of grain, and stocked the land down to grass.'

HAY MAKING. It is a matter of much importance to the husbandman that he should take time by the foretop during the season for making hay. He must drive his business instead of being driven by it. Indolence or improper management in hay-time will soon give a sorry complexion to a farmer's affairs. A day or two lost or misemployed while the sun shines, and your grass suffers for lack of the scythe and the rake, or your grain is *going back* into the ground, while the sickle is rusting on a peg behind the door, and its owner is asleep or gone a journey, may be the means of introducing Mr. Deputy Sheriff on your premises, who may do more harm than a crop of thistles or a host of Hessian flies.

It is best, generally speaking, to cut your very heaviest grass first of all, and if it be lodged, or in danger of lodging, or the lower leaves and bottom of the stalks are beginning to turn yellow, although the grass is hardly headed, and appears not to have obtained more than two-thirds of its growth, you had better begin upon it. But when you have help enough, and your grass stands up well, you will do best to wait till the blossom is fully formed, and is beginning to turn brown. Clover is the most critical grass, and requires the most attention. 'In all cases,' says Sir John Sinclair, 'clover ought to be mown *before the seed is formed*'* that the full juice and nourishment of the plants may be retained in the hay. By the adoption of this system the hay is cut in a better season, it can be more easily secured, and is much more valuable. Nor is the strength of the plant lodged in the seed, which is often lost.

'After being cut, the clover should remain in the swath till it is dried about two-thirds of its thickness. It is then not *tedded* or strewed, but turned over, either by the hands, or the heads of hay rakes. If turned over in the morning of a dry day, it may be cocked in the evening. The hay is

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* It may not be amiss, however, to state in this place, that agriculturists do not altogether agree on this point. In 'Memoirs of the New York Board of Agriculture,' vol. ii. p. 30, it is asserted that 'all the grasses are more nutritious if not mowed until the seed is fully grown. It should not be entirely ripened, however.' The Farmer's Assistant tells us that 'the best time for cutting herd's grass, [timothy] where but one crop is cut in the season, is when the seeds of the grass are fully formed, but before they have become fully ripe; but as farmers cannot all cut their hay in a day or two, it is necessary that they should begin before this time, that they may not end too long after it. The same time is also proper for cutting clover; or rather when a part of the heads begin to turn brown. Foul meadow or birdgrass may be cut much later, without being hurt by long standing.'

as little shaken or scattered about afterwards as possible; and if the weather is good, after remaining two or three days in the cock, it may be carted into the stack.'

It is asserted by the 'Farmer's Guide,' that 'grass will not thrive well that is not mown quite close; and the loss in the crop where this is not done is very considerable, *as one inch at the bottom weighs more than several at the top.*'

The fore part of the season for making hay is, we believe, usually attended with less rain than the latter part. The days, too, are longer, and the dews are less copious. Farmers will, therefore, find additional motives from these circumstances to industry and exertion in early hay-time. Besides, if haying is protracted till harvest commences, the business of one season presses on that of another, and some crops will be nearly or quite spoiled in consequence of not being gathered in due time. The forehanded and industrious farmer thus possesses great advantages over one whom indolence or poverty induces to procrastinate the indispensable labors of his vocation.

Great advantages would result to the farmer, particularly in haying and harvesting, if he could form an estimate of the weather so as to be able to foresee with tolerable accuracy what would be its state for a few days, or even for twenty-four hours subsequent to the period of observation. Dr. Jenner's versified statement of 'Signs of Rain,' (published in the New England Farmer, vol. ii. p. 288,) may prove useful for this purpose, and the rhymes may assist the memory. A certain French philosopher, some years since, published an article, in which he asserted, in substance, that the web of a common spider is a sure index of the state of the air for twelve or fourteen days to come. If the weather is to be fair and calm, the principal thread will be spun to a great length; if, on the contrary, the weather is to be stormy and boisterous, the thread will be short and thick; and if the spider is seen to repair the damages its slender thread may sustain, you may anticipate pleasant weather for many days. So says the philosopher, but we cannot vouch for the accuracy of his saying. It may, however, not be amiss for the man of observation to pay some attention to this subject, for we know that the instinct of an insect is often more to be depended on than the researches of science.

In this climate, a southerly wind, if it continues steadfast for forty-eight hours, is generally followed by rain. If the wind, however, shifts its course with the sun, or, as sailors phrase it, goes round with the sun, in the morning blowing from the south, or east of south, and changing westerly as the sun advances, it generally indicates dry weather. If the wind shifts in a course opposite to the apparent course of the sun, rain commonly succeeds. If the wind continues southerly, and blows briskly through the night, it commonly, as the phrase is, 'blows up rain.' This effect of a south wind in this country may be thus accounted for. A southerly wind is a current of air which has its origin in warmer latitudes than those in which we are situated. This current in passing over the ocean imbibes or takes up as much water as air of its temperature can hold in solution. Passing into higher or colder latitudes the air of the current parts with a portion of its heat or caloric, and cannot retain so much water as it held in its outset. Clouds or vapors are therefore formed, and the excess of moisture is deposited in mist, rain, hail, or snow, according to circumstances, the season, &c. On the contrary a northerly wind, coming from a comparatively cold latitude, acquires caloric as it advances, and with that acquisition its capacity for holding water in solution is increased. Therefore a northerly wind is a *drying* wind, and its predominance soon dissipates clouds and introduces fair weather.

But to come down from the clouds to matters more within the reach of the reader. It has been often recommended by writers on agriculture to cart hay, particularly clover, before the stalks are dry, and either to put it up with alternate layers of straw, or to salt it at the rate of from half to one bushel of salt to the ton.

'Salt hay in this country has usually been hurt by lying too long in the swaths. The method in which I have treated it for several years, is, to cock it the next day after it is cut, and carry it in, without delaying more than one day, and put a layer of some kind of dry straw between load and load of it in the mow, to prevent its taking damage by over-heating. The straw contracts so much of its moisture and saltness, that the cattle will eat it very freely; and the hay is far better than that made in the common way.'*

The making of herbage plants [such as clover, lucerne, sainfoin burnet, &c.] into hay, is a process somewhat different from that of making hay from natural grasses. As soon as the swath is thoroughly dry above, it is gently turn-

* Deane's New England Farmer.

ed over (not tedded nor scattered) without breaking it. Sometimes this is done by the hand, or by a small fork; and some farmers are so anxious to prevent the swath from being broken, that they will not permit the use of the rake shaft. Another writer observes, that the practice of the best English, Flemish, and French farmers, is to expose the hay as little as possible to the sun. It is carried in dry, but preserves its green color; and we see hay of one or two years old in their market, of so bright a green color that we could scarcely conceive it to be cured. Yet they are in the practice of preserving it for years, and value it more for its age. If such a course be best in climates so cool and cloudy, how much more important would it be under our scorching summer suns.

'But if the weather be unsettled, or if showers be frequent, it may be better to *spread grass well* as soon as it is mowed, stir it often, cock it the same day it is mowed; open it the next fair day, when the dew is off; let it sweat a little in the cock, and house it as soon as it is dry enough. It will bear to be laid greener on a scaffold than in a ground mow; and in a narrow mow greener than in a broad one; and that which is least of all made should be put upon the scaffold.' —*Deane.*

Sir John Sinclair is very explicit on the subject of 'making clover into hay.' 'The process,' he observes, 'is quite different from the plan of making hay from natural grasses. Mr. Lorrain gives us both sides of this question. He says, 'I did not like to abandon the practice of curing hay in the swath, having observed that it saved labor. The grasses are at all times very expeditiously turned in the swath. If continued rains occur, the swaths are not only quickly turned, but if the sun shines powerfully between the showers, the inside of them is not parched by its rays. By turning the swaths throughout long continued rain, as often as the under side of them was likely to be injured by fermentation, I have saved extensive fields of hay; while my neighbors, who gave no attention to this interesting subject, had their crops entirely ruined. If the grasses, however, be raked up into small winrows, they are as readily turned, and may be as effectually preserved as if they remained in swaths, but in this case the labor is greater.'

The same writer, however, in the next paragraph, takes other ground. 'Curing hay,' he observes, 'in swath, to save the juices, seems to be not only practically wrong, but also opposed to reason. The confined heat and moisture in the interior of the swath promote fermentation, and must be more or less injurious to the nutritive matter contained in the grasses. It is exactly calculated to weaken the grasp of the leaves, and to separate them from the stalk. It also greatly weakens their general texture and causes them to crumble into pieces when they become dry. While this is doing, the outside surface of the swath is scorched by the rays of the sun, and becomes but little better than straw, before the inside is moderately cured. In raking, cocking, heaping, and inning, the swaths are so far separated, that many of the leaves are lost before the hay gets into the mow; but few of them get into the rack.'

We have thus given both sides of the controverted question in agriculture, and our readers will take that which appears to them most tenable. We confess ourselves rather inclined to embrace the opinions of a correspondent who says, 'If it be correct to "make hay while the sun shines," it may be well to make it as quickly as possible; but in this, as in many other processes, circumstances alter cases."

HARVESTING. It is asserted, as a general rule, that the proper time to reap wheat or rye is when the straw begins to shrink and become white about half an inch below the ear. This appearance is a sure indication that the grain has ceased to receive nourishment from the roots of the plant; and by cutting early, provided it is not taken to the barn or stack too green, the following advantages will be gained: 1st. The grain will make more and whiter flour. 2d. There will be less wasted by the grain's shelling. 3d. By commencing harvest early, you will have a fairer prospect of finishing before the last cuttings become too ripe, so that much of the grain will shell out in reaping and securing the crop. 4th. If you cut your grain as soon as it will answer, your straw and chaff will contain much more nourishment than if it were bleached and made brittle by the sun, air, dew, and rain, all of which combine to deprive it of most of its value for fodder. 5th. Should you plough in your stubble immediately after harvest, or mow it and secure it for fodder or litter, (either of which modes of management is perfectly consonant with the rules of good husbandry,) the stubble will make much better food for your cattle or manure for your ground, than if it had yielded all its sweets and much of its substance to the greedy elements above mentioned.

If your wheat or rye is much affected by blight or rust, it should be cut even while still in the milk, and afterwards exposed to the sun and air, till the straw is sufficiently dry and the grain so much hardened that it will answer to deposit in the barn or stack. The heads, in such cases, should be so placed by the reapers as not to touch the ground. This may be done by laying the top ends of each handful on the lower end of the preceding one.

If your grain is encumbered with grass or weeds, you must cut it pretty near the top, in order to avoid as much as possible those extraneous substances. It will also be necessary to reap somewhat earlier than might be otherwise expedient, that you may have time to dry the weeds without danger of the grain's shelling out. If your grain is very ripe when you harvest it, the bands should be made early in the morning while the straw is moist and pliable. And Dr. Deane recommends, in such cases, to bind the sheaves when the air begins to be damp towards evening, as the least degree of moisture will toughen the straw.

It has been recommended by several English writers to bind wheat as well as rye with only one length of the straw. If the straw is pretty long, and not very thoroughly dry, this may be good economy. You save the trouble of making bands; your wheat will dry better in the sheaf; (as the sheaves must of course be small;) and though it may take some more time and trouble to pitch and handle it, we believe the advantages, in many cases, will turn the scale in favor of binding wheat with single lengths of straw.

In stowing wheat or rye, some persons deposit the sheaves on a mow of hay; but this is a bad plan, as the grain presses the hay so that it is apt to become musty, and communicate a musty or mouldy taint to the superincumbent grain; which will be harder to thresh than if it had a more dry and airy location. It may be placed on a scaffold of rails, laid on the beams, and over the floor of a barn; though it is not so easy to procure it for threshing as if it were laid on a scaffold of less elevation. But this disadvantage may be more than compensated by its being in a situation favorable for drying. If there is a deficiency of barn room, the sheaves may be stored in stacks. In that case, 'care should be taken that the grain may not draw moisture from the ground, by laying boards, straw, or rubbish under the stack. A better way still is to have a tight floor of boards mounted on four blocks, set in the ground, and so high from the ground as to prevent the entering of vermin.

'In building a stack, care should be taken to keep the seed ends of the sheaves in the middle, and a little higher than the outer ends. No fowls can then come at the grain; and the rain that falls on the outer ends will run off, and not pass towards the centre. The stack should be well topped with straw, that the rain may be completely turned off.'

Oats. It is advised to harvest oats before the straw has wholly turned yellow. The straw will be of little value if permitted to stand till it becomes white and destitute of sap. Though oats should be well dried on the ground, after cutting, they should not be raked nor handled when they are in the driest state. They should be gathered mornings and evenings, when the straw is made limber and pliable by the moisture of the air. If they are housed while a little damp, there will be no danger if they have been previously thoroughly dried.

Barley. We are told by the wise men of agriculture, that some of the rules which should be observed in harvesting wheat, rye, and oats, will not apply to barley. Willich's Domestic Encyclopedia states, that, 'with respect to the time when barley is fit to be mowed, farmers frequently fall into the error of cutting it before it is perfectly ripe; thinking it will attain to perfect maturity if it lie in the swath. This, however, is a very common error, as it will shrivel in the field, and afterwards make but an indifferent malt; it also threshes with more difficulty, and is apt to be bruised under the flail. The only certain test of judging when it is fit to mow must be from the dropping and falling of the ears, so as to double against the straw. In that state, and not before, it may be cut with all expedition, and carried in without danger to the mow.

Dr. Deane's New England Farmer states, that 'some have got an opinion that barley should be harvested before it is quite ripe. Though the flour may be a little whiter, the grain shrinks so much that the crop seems greatly diminished and wasted by early cutting. No grain, I think, requires more ripening than this; and it is not apt to scatter out when it is very ripe. It should be threshed soon after harvesting; and much beating, after it is cleared from the straw, is necessary in order to get off the beards. Let it lie a night or two in the dew, after it is cut, and the beards will come off the more easily.

DRAINS used in farming are of two kinds, open and covered. Drains should be of a size and depth proportioned to the extent of the swamp and the probable quantity of water for which they are designed to be channels. They should generally be carried through the lowest and wettest part of the soil, although it should be necessary, in order to effect that purpose, to deviate from straight lines. Open drains sometimes answer the double purpose of conveying off superfluous water and of inclosing fields; but they make a hazardous and inconvenient fence without the addition of a bank, hedge, or railing. The Farmer's Assistant says, 'When a ditch is made for a fence, it ought to be four feet wide at the top, one or less at the bottom, and about two and a half deep; with the earth all thrown out on one side, and banked up as high as possible.' Sir John Sinclair states, that 'it is a general rule regarding open drains, with a view of giving sufficient slope and stability to their sides, that the width at top should be three times as much as that which is necessary at the bottom, and in the case of peat-mosses or soft soils, it should be such as to allow the water to run off without stagnation, but not with so rapid a motion as to injure the bottom.'

But before you attempt to drain a piece of land, it will be well not only to calculate the cost, but to ascertain the nature of the soil which it is proposed to render fit for cultivation. If the subsoil or under layer be clay, the swamp may be worth draining, though there should be no more than six inches of black soil or mud over it, for the clay and the mud mixed will make a fertile soil. But if the subsoil or under stratum be gravel or white sand, it will not, in common cases, be best to undertake draining, unless the depth of black mud be as much as from fifteen or eighteen inches deep; for the soil will settle after draining, and be less deep than it was before. But the situation of the land to be drained may authorize some variation from these general rules.

The manner of draining a swamp is as follows: Beginning at the outlet, pass a large ditch through it, so as mostly to cut the lowest parts. Then make another ditch quite round it, near to the border, to cut off the springs which come from the upland, and to receive the water that runs down from the hills upon the surface in great rains. These ditches should be larger or smaller, in some proportion to the size of the swamp, the shape and size of the hills which surround it, and other circumstances, which might tend to greater or less quantities of water being occasionally or generally led to the ditches. If the swamp be large, it may be necessary that some smaller cross drains should be cut in several of the lowest parts. The bottom of the main ditches, when the soil is not of an extraordinary depth, must be lower than the bottom of the loose soil; otherwise the soil will never become sufficiently dry and firm.'*

It is said by Sir John Sinclair, (Code of Agriculture, page 182,) that 'in all drains it is a rule to begin at the lowest place and to work upwards, by which the water will always pass from the workmen and point out the level. This enables the laborers also to work in coarse weather, and prevents their being interrupted by wet so early in the season as otherwise might happen.'

The mud and other materials which are dug out of a ditch or drain should not be suffered to lie in heaps or banks by the side of the ditch, but should be spread as equally as possible over the surface of the drained land. In this way, the matter taken from the ditches will tend to level the surface of the swamp, will, perhaps, serve in some measure for manure, and will not present any impediment to the passage of the water to the ditches. In some cases it may be advisable to transport the earth which is taken from the ditches to the farm-yard or the hogpen, to form a part of that layer which good farmers generally spread over those places in autumn, to imbibe liquid manure, or make into compost with dung. In many instances, we are told, that the earth thus dug out of ditches is thought to be worth enough to pay for the expense of digging the ditches.

The following communication on the subject of underdraining is from the New England Farmer, vol. x. p. 97:

Underdraining. In a late number of the New England Farmer, my friend judge Buel, in an article on 'underdraining,' was pleased to speak in favorable terms of my practice in this species of improvement, of my culture in general, and to ask for some communication on the subject. As no one in our country has more successfully blended theory with

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* See Deane's New England Farmer, article Drains

practice in the various departments of husbandry than Mr. Buel, I appreciate this notice from one so competent to make improvements and so happy in his manner of detailing them to the agricultural community.

As regards underdraining, and the many benefits resulting from it, my observation and experience fully corroborate all judge Buel has said in its favor ; indeed, without this salutary and simple operation, no inconsiderable proportion of many valuable districts of our country must continue little better than waste. It is generally total loss of labor to the farmer who attempts to cultivate wet lands in our rigorous climate, and by draining, these useless inhospitable acres have been found of the kindliest and most productive character.

Having a surplus of stones on my estate beyond what fences require, I use the smaller and ill-formed for drains; they have the advantage of brush in durability and of tiles in economy. My drains are, for the most part, three feet in depth, two feet in width at top, sloping to one at bottom. The bottom stones are largest, and are carefully placed to allow the water to flow freely beneath, while above the small stones are thrown in at random, so that when levelled they are beneath the plough. Over these swingle-tow, shavings, or straw, may be thrown, after which the earth can be replaced by the spade or plough, so as to present a rather higher surface than the grounds adjacent, and the business is accomplished. It is very essential that the descent be easy, neither too quick nor too slow, and that all *surface water* be excluded, as it would speedily choke and destroy the underdraining. I estimate the average cost of such drains at sixty-two and a half cents the rod. It should be remarked, that underdraining is adapted to lands presenting sufficient declivity to carry off the springs, and it is only the under water that is meant to be drained in this manner, while open ditches are adapted to the bottom lands for the conveyance of surface water. I will state what appears to me the prominent advantages that the cultivator may promise himself by a thorough system of draining.

In the first place, he creates, as it were, so much additional terra firma, and adds essentially to the health of all around him, by correcting the ill tendencies of excessive moisture. He can cultivate reclaimed lands several weeks earlier and as much later in each year than those that are unreclaimed, his crops are better and more sure. The labor of after tillage is much diminished. The stones that impede the plough and scythe are removed, and not the least essential benefit is the *constant supplies of water* which may be insured in any field inclining to moisture, which, with reference to animals, will, as a permanent convenience and advantage, fully compensate the expense of drains.

I have just put down a field of wheat which has required extensive underdraining. This field has required two hundred and fifty rods of stone draining, and I hope to be remunerated the whole expense in the surplus crops of the two next years, to say nothing of the pleasure of witnessing the finest grains and kindliest grasses taking the place of bulrushes and wild grass.

I am, sir, your most obedient servant,

HENRY W. DELAVAN.

PASTURE. To manage pasture land advantageously, it should be well fenced in small lots, of four, eight, or twelve acres, according to the largeness of one's farm and stock; and these lots should be bordered at least with rows of trees. It is best that trees of some kind or other should be growing scattered in every point of a pasture, so that the cattle may never have to go far in a hot hour to obtain a comfortable shade. The grass will spring earlier in lots that are thus sheltered, and they will bear drought the better. But too great a proportion of shade should be avoided, as it will give a sourness to the grass.

Small lots thus sheltered are not left bare of snow so early in the spring as larger ones lying bare, as fences and trees cause more of it to remain upon the ground. The cold winds in March and April hurt the grass much when the ground is bare. And the winds in winter will not suffer snow to lie deep on land that is too open to the rake of winds and storms.

It is hurtful to pastures to turn in cattle too early in the spring; and most hurtful to those pastures in which the grass springs earliest, as in very low and wet pastures. Potching such land in the spring destroys the sward, so that it will produce the less quantity of grass. Neither should cattle be let into any pasture until the grass is so much grown as to afford them a good bite, so that they may fill themselves without rambling over the whole lot. The

20th of May is early enough to turn cattle into almost any of our pastures. Out of some they should be kept later. The driest pastures should be used first, though in them the grass is shortest, that the potching of the ground in the wettest may be prevented.

The bushes and shrubs that rise in pastures should be cut in the most likely times to destroy them. Thistles and other bad weeds should be cut down before their seeds have ripened; and ant-hills should be destroyed. Much may be done towards subduing a bushy pasture by keeping cattle hungry in it. A continual browsing keeps down the young shoots, and totally kills many of the bushes. Steers and heifers may mend such a pasture, and continue growing.

But as to cleared pastures, it is not right to turn in all sorts of cattle promiscuously. Milch kine, working oxen, and fatting beasts, should have the first feeding of an inclosure; afterwards, sheep and horses. When the first lot is thus fed off, it should be shut up, and the dung that has been dropped should be beat to pieces, and well scattered. Afterwards, the second pasture should be treated in the same manner, and the rest in course, feeding the wettest pasture after the driest, that the soil may be less potched.

Something considerable is saved by letting all sorts of grazing animals take their turn in a pasture. By means of this, nearly all the herbage produced will be eaten; much of which would otherwise be lost. Horses will eat the leavings of horned cattle; and sheep will eat some things that both the one and the other leave.

But if in a course of pasturing, by means of a fruitful year or a scanty stock of cattle, some grass of a good kind should run up to seed and not be eaten, it need not be regretted; for a new supply of seed will fill the ground with new roots, which are better than old ones. And I know of no grass that never needs renewing from the seed.

A farmer needs not to be told, that if he turn swine into a pasture, they should have rings in their noses, unless brakes and other weeds need to be rooted out. Swine may do service in this way. They should never have the first of the feed; for they will foul the grass, and make it distasteful to horses and cattle.

Let the stock of a farmer be greater or less, he should have at least four inclosures of pasture land. One inclosure may be fed two weeks, and then shut up to grow; then another. Each one will recruit well in six weeks; and each will have this space of time to recruit. But in the latter part of October, the cattle may range through all the lots, unless some one may become too wet and soft. In this case, it ought to be shut up, and kept so till feeding time the next year.

But that farmers may not be troubled with low miry pastures, they should drain them, if it be practicable, or can be done consistently with their other business. If they should produce a smaller quantity of grass afterwards, it will be sweeter, and of more value. It is well known, that cattle fatted in a dry pasture have better tasted flesh than those which are fatted in a wet one. In the old countries it will fetch a higher price. This is particularly the case as to mutton.

Feeding pastures in rotation is of greater advantage than some are apt to imagine. One acre, managed according to the above directions, will turn to better account, as some say who have practised it, than three acres in the common way. By the common way I would be understood to mean, having weak and tottering fences, that will drop of themselves in a few months, and never can resist the violence of disorderly cattle; suffering weeds and bushes to overrun the land; keeping all the pasture land in one inclosure; turning in all sorts of stock together; suffering the fence to drop down in autumn, so as to lay the pasture common to all the swine and cattle that please to enter; and not putting up the fence again till the first of May, or later. Such management is too common in all the parts of this country with which I am most acquainted. I would hope it is not universal.

Land which is constantly used as pasture will be enriched. Therefore it is advisable to mow a pasture lot once in three or four years, if the surface be so level as to admit of it. In the mean time, to make amends for the loss of pasture, a mowing lot may be pastured. It will thus be improved: and if the grass do not grow so rank afterwards in the pasture lot, it will be more clear of weeds, and bear better grass. Alternate pasturing and mowing has the advantage of saving a good deal of expense and trouble in manuring the mowing grounds.

Though pastures need manuring less than other lands, yet, when bushes, bad weeds, &c. are burnt upon them, the ashes should be spread thinly over the surface. The grass will thus be improved: and grass seeds should be sown upon the burnt spots, that no part may be vacant of grass.

Sheep, calves, and horses, unless they are worked, it is said, require no water in their pastures. The want of water induces them to feed in the night, when the dew is on and the grass the more nutritious. Cows however want pure water.

In pastures which are on side-hills, water may generally be obtained by digging horizontally into the side of the hill, till it is found, and then carrying it out with a pipe.—*Deane.*

'We learn from English writers on agriculture, that three modes have been adopted in Great Britain for consuming clover and other herbage plants by pasturing. These are tethering, or fastening the feeding animal to a stake, hurdling, and free pasturage. In the *Agricultural Report of Aberdeenshire,* it is stated that there are some cases in which the plan of tethering can be practised with more profit than even soiling. In the neighborhood of Peterhead, for instance, they tether milch cows on their grass fields, in a regular and systematic method, moving each tether forward in a straight line, not above one foot at a time, so as to prevent the cows from treading on the grass that is to be eaten; care being always taken to move the tether forward, like a person cutting clover with a scythe, from one end of the field to the other. In this way, a greater number of cows can be kept on the same quantity of grass than by any other plan, except where it grows high enough to be cut and given them green in houses. In one instance, the system was carried to great perfection by a gentleman who kept a few sheep upon longer tethers, following the cows. Sometimes also he tethered horses afterwards upon the same field, which prevented any possible waste, for the tufts of grass produced by the dung of one species of animal will be eaten by those of another kind without reluctance. This mode was peculiarly calculated for the cow-feeders in Peterhead; as from the smallness of their holdings they could not keep servants to cut or horses to carry home the grass to their houses, to be consumed in a green state.

'In hurdling off clover or herbage crops, a portion of the field is inclosed by hurdles, [movable wooden fences] in which sheep are confined, and as the crop is consumed the pen is changed to a fresh place, until the whole is fed off. This practice is very extensively adopted at Holkham, [Eng.]

and is peculiarly calculated for light and dry soils. Its advantages are, that the grass is more economically consumed; that the stock thrives better, having daily a fresh bite; and that the dung which falls, being more concentrated, is more likely to be of use.'—*Loudon.*

Water should be provided for every field under pasture; and also shelter and shade, either by a few trees, or by a portable shed, which may be moved with the stock from one inclosure to another. Where there are no trees, rubbing posts are also a desirable addition. In Germany they have portable sheds which are employed both in summer and winter, and generally with a piece of rock-salt fixed to a post for the cattle to lick at will.

Some graziers mix a few sheep and one or two colts in each pasture, which both turn to account, and do little injury to the grazing cattle. In some cases, we are told that sheep are beneficial to pastures, by eating down and destroying white weed, and some other useless and pernicious plants.

So various is the appetite of animals, that there is scarcely any plant which is not chosen by some and left untouched by others. The following is said to be a fact, known and practised on by graziers in Holland. When eight cows have been in a pasture, and can no longer obtain nourishment, two horses will do very well there for some days, and when nothing is left for the horses, four sheep will live upon it; this not only proceeds from their differing in the choice of plants, but from the formation of their mouths, which are not equally adapted to lay hold of the grass.

Stocking a pasture with as many sheep as it will support is recommended for forming a tender herbage, and causing the grass to mat or grow very thick at the bottom.

An English writer says, 'in turning out horses to grass in the spring, it is usual to choose the forenoon of a fine day to do it in; the natural consequence is, the horse fills his belly during the sunshine, and lays down to rest during the cold of the night, thereby probably exposing himself to disorders. In some parts of Yorkshire a better practice prevails: the horse is turned out at bed-time; the consequence is, he eats all night, and sleeps in the sunshine of the next day.'

POULTRY. In order to have fine fowls, it is necessary to choose a good breed, and have a proper care taken of them. The Canton breed is thought highly of: and it is certainly desirable to have a fine large kind, but people differ in their opinion which is best. It is as important to cross the breeds of fowls as of other animals; hence it is improper to save males and females from the same sittings of eggs, if they are to be kept for propagation. The black is very juicy; but do not answer so well for boiling, as their legs partake of their color. They should be fed as nearly as possible at the same hour and place. Potatoes boiled, unskinned, in a little water, and then cut, and either wet with skimmed milk or not, form one of the best foods. Turkeys and fowls thrive amazingly on them. The milk must not be sour.

The best age for setting a hen is from two to five years; and you should remark which hens make the best brooders, and keep those to laying who are giddy and careless of their young. In justice to the animal creation, however, it must be observed, there are but few instances of bad parents for the time their nursing is necessary.

Hens sit twenty days. Convenient places should be provided for their laying, as these will be proper for sitting likewise. If the hen-house is not secured from vermin, the eggs will be sucked and the fowls destroyed.

Those hens are usually preferred which have tufts of feathers on their heads; those that crow are not looked upon as profitable. Some fine young fowls should be reared every year, to keep up a stock of good breeders; and by this attention, and removing bad layers and careless nurses, you will have a chance of a good stock.

Let the hens lay some time before you set them, which should be done from the end of February to the beginning of May. While hens are laying, feed them well, and sometimes with oats.

Broods of chickens are hatched all through the summer, but those that come out very late require much care till they have gained some strength.

If the eggs of any sort are put under a hen with some of her own, observe to add her own as many days after the others as there is difference in the length of their sitting. A turkey and duck sit thirty days. Choose large clear eggs to put her upon, and such a number as she can properly cover. If very large eggs, there are sometimes two yolks, and of course neither will be productive. Ten or twelve are quite enough.

A hen-house should be large and high; and should be frequently cleaned out, or the vermin of fowls will increase greatly. But hens must not be disturbed while sitting; for if frightened, they sometimes forsake their nests. Wormwood and rue should be planted plentifully about their houses; boil some of the former, and sprinkle it about the floor, which should be of smooth earth not paved. The windows of the house should be open to the rising sun, and a hole must be left at the door, to let the smaller fowls go in; the larger may be let in and out by opening the door. There should be a small sliding board to shut down when the fowls are gone to roost, which would prevent the small beasts of prey from committing ravages; and a good strong door and lock may possibly, in some measure, prevent the depredations of human enemies.

When some of the chickens are hatched long before the others, it may be necessary to keep them in a basket of wool till the others come forth. The day after they are hatched, give them some crumbs of white bread, and small (or rather cracked) grits soaked in milk. As soon as they have gained a little strength feed them with curd, cheese parings cut small, boiled corn, or any soft food, but nothing sour; and give them clean water twice a day. Keep the hen under a pen till the young have strength to follow her about, which will be in two or three weeks, and be sure to feed her well.

The food of fowls goes first into their crop, which softens it; and then passes into the gizzard, which by constant friction macerates it: and this is facilitated by small stones, which are generally found there, and which help to digest the food.

The pip in fowls is occasioned by drinking dirty water, or taking filthy food. A white thin scale on the tongue is the symptom. Pull the scale off with your nail, and rub the tongue with some salt; and the complaint will be removed.

It answers well to pay some boy employed in the farm or stable so much a hundred for the eggs he brings in. It will be his interest then to save them from being purloined, which nobody but one in his situation can prevent; and six or eight cents a hundred will be buying eggs cheap.

To fatten Fowls or Chickens in four or five Days. Set rice over the fire with skimmed milk, only as much as will serve one day. Let it boil till the rice is quite swelled out: you may add a tea-spoonful or two of sugar, but it will do well without. Feed them three times a day, in common pans, giving them only as much as will quite fill them at once. When you put fresh, let the pans be set in water, that no sourness may be conveyed to the fowls, as that prevents them from fattening. Give them clean water, or the milk of rice, to drink; but the less wet the latter is when perfectly soaked the better. By this method the flesh will have a clear whiteness which no other food gives; and when it is considered how far a pound of rice will go, and how much time is saved by this mode, it will be found to be cheap. The pen should be daily cleaned, and no food given for sixteen hours before poultry be killed. A proportion of *animal* mixed with vegetable food is said to cause poultry to thrive rapidly, but they should be confined to a vegetable diet for a fortnight or three weeks before they are killed for eating. A quantity of charcoal broken in small pieces and placed within the reach of poultry is said to increase their appetite, promote their digestion, and expedite their fattening.

To choose Eggs at Market and preserve them. Put the large end of the egg to your tongue; if it feels warm it is new. In new-laid eggs there is a small division of the skin from the shell, which is filled with air, and is perceptible to the eye at the end. On looking through them against the sun or a candle, if fresh, eggs will be pretty clear. If they shake they are not fresh.

Eggs may be bought cheapest when the hens first begin to lay in the spring, before they sit; in fall and winter they become dear. They may be preserved fresh by dipping them in boiling water and instantly taking them out, or by oiling the shell; either of which way is to prevent the air passing through it: or kept on shelves with small holes to receive one in each, and be turned every other day; or close packed in the keg, and covered with strong lime-water.*

BIRDS. The following remarks on shooting birds, &c., are from a communication, published in the New England Farmer, vol. ix. p. 338, by a writer with the signature '*Cultivator.*'

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* For Treatises on Poultry and their different varieties, see Fessenden's Mowbray, published by Lilly and Wait, and New England Farmer, vol. ix. p. 254, 278, 293, 318, 341.

It is a well known fact that the alarming increase of worms and insects in making ravages upon our fruit-trees and fruit, not only paralyzes the efforts and disheartens the hopes of the cultivator, but threatens total destruction to many of the most delicious kinds. So extensive are their ravages that but very few of our apricots and plums ever ripen without premature decay from the worm generated by the beetles which surround our trees in the twilight of the evening in great numbers when the fruit is quite young. And when the produce of our apple, pear, or peach trees is small, but few of these escape the same fate.

I attribute the rapid and alarming *increase* of these worms and insects *wholly* to the diminution of those birds which fall a prey to our sportsmen, which are known to feed upon them, and for whose subsistence these insects were apparently created.

In addition to the important usefulness of these birds, their musical notes in the twilight of the morning are peculiarly delightful; awaking the cultivator to the sublime contemplation and enjoyment of all the infinite beauties of creation.

In vain will be all our toil and labor, in vain the united efforts of horticultural societies for increasing and perfecting the cultivation of the most delicious varieties of fruits, unless we can *increase*, or at least *cease* to *diminish* these useful and melodious birds.

If we have a statute in this commonwealth providing for the protection of these birds, let us unite our efforts to arrest this wanton destruction of them *by enforcing the penalties of the law in every instance of its violation.* Our Horticultural society can scarcely do a greater service in promoting the objects of its organization, than by making a spontaneous and vigorous effort to this effect.

If there be no statute for the protection of these invaluable creatures, I would earnestly, yet respectfully, suggest to the Horticultural society the propriety and even necessity of their petitioning our legislature at their next session for such an act.

It is a common practice with these sportsmen through the summer to range the groves and orchards in this vicinity, almost every pleasant day, and more numerously on holidays, and to shoot *every bird* that comes within their reach.

It is not however a small nor an easy task for one individual to get their names, residence, and the evidence necessary for their conviction; but it requires the united efforts of all who are immediately interested. Already have these sportsmen commenced their wanton destruction of these useful creatures, even before they had time to build a nest for rearing of their young. Birds that have survived the dreary winter in a more genial clime, having now returned to bless our efforts by their industry and to cheer our days with their melody, are scarcely permitted to commence their vernal song, ere they must fall victims to a WANTON IDLENESS that is as destitute of moral feeling as of useful employment.

The following was originally published in the Boston Patriot.

'*On Birds and their Misfortunes.* We have already intimated our opinion, that the labors of the scientific ornithologists are of far more practical utility than the casual observer might suppose; and that, even in the business of legislation, a regard to his researches might prevent many errors, which may much affect public welfare. The legislation on the subject of birds has been marked by some essential errors, which have led to real evil. By the law of 1817, woodcocks, snipes, larks, and robins, were protected at certain seasons of the year, whilst war to the knife was declared against crows, blackbirds, owls, blue-jays, and hawks; these last were treated as a sort of pirates, subject to suspension at the yard-arm with the least possible ceremony. It so happens, that the character of these very birds has been singularly mistaken; for while the ordnance of legislation has been thus systematically levelled at them, they, on a principle which man would do extremely well to imitate, have been returning good for evil: they have been diligently engaged in extirpating all sorts of vermin, while never were the vilest vermin half so ill-treated by the human race. The crow, for example, who is generally regarded as a most suspicious character, has had great injustice done him. In the spring, when the ground is moist, he lives in a state of the most triumphant luxury on grubs; he eats the young corn, it is true, but it is a necessary of life to which he never resorts except when his supply of animal food is shortened. After the corn is tolerably grown, he has nothing more to do with it; and in any stage he destroys at least five hundred pernicious grubs and insects for every blade of corn which he pillages from man. In the southern states, he is regularly permitted to accompany the ploughman, and collects the grubs from the newly-opened furrow; his life is thus secured by the safest of all tenures, that of the interest of man in permitting him to live.

'There is scarcely a farm in England without its rookery; the humid atmosphere multiplies every species of insect, and those birds reward man for his forbearance by ridding him of legions of his foes. By a policy like that which dictated the revocation of the edict of Nantes, they have occasionally been exposed to the mischievous propensities of unruly boys, who, as far as utility is concerned, are not to be compared to crows: but the error of this step soon became obvious, and they are now received with a universal welcome. The hawk enjoys a doubtful reputation in the hen-roost: he sometimes destroys the chickens but with the consistency of man does not like to see his infirmities copied by another; and by way of compensation demolishes the fox, which eats twenty chickens where he eats but one; so that it is hardly the part of wisdom to set a price upon his head, while the fox, a hardened knave, is not honored with a penal statute. How the owl became to be included in this black list, it is difficult to conjecture; he is a grave, reflecting bird, who has nothing to do with man, except to benefit him by eating weasels, foxes, racoons, rats, and mice, a sin for which most housekeepers will readily forgive him. In some parts of Europe he is kept in families, like the cat, whom he equals in patience and supasses in alertness. Another of these birds, the blackbird, is the avowed enemy of grubs, like the crow; in the middle states, the farmer knows the value of his company to pluck them from the furrow; and while other less pains-taking birds collect the vermin from the surface, his investigations are more profound, and he digs to the depth of several inches in order to discover them. When the insects are no longer to be found, he eats the corn, as well he may, but even then asks but a moderate compensation for his former services. Five hundred blackbirds do less injury to the corn than a single squirrel. The last upon the catalogue of persecuted birds is the blue-jay. Whoever watches him in the garden will see him descend incessantly from the branches, pouncing every time upon the grub, his enemy and ours.

'We have already seen that the act to which we have referred protects some birds at certain seasons of the year; among others, the robin, who lives on insects and worms, and has no taste for vegetable diet, and the lark, who is extremely useful in his way. The only wonder is, that it should have been thought expedient to allow them to be shot in any season. The quail, another of the privileged class, has no title to be named in company with the others; in the planting time, he makes more havoc than a regiment of crows, without atoning for his misdeeds by demolishing a single grub. Nor is the partridge a much more scrupulous respecter of the rights of property; though, as he lives in comparative retirement, he succeeds in preserving a better name for honesty.

'There are some of our most familiar birds, of which a word may here be said. Every body has seen the little goldfinch on the thistle by the way-side, and wondered, perhaps, that his taste should lead him to so thorny a luxury; but he is all this while engaged in devouring the seeds, which but for him would overrun the grounds of every farmer. Even the bob-o'-link, a most conceited coxcomb, who steals with all imaginable grace, destroys millions of the insects which annoy the farmer most. All the little birds, in fact, which are seen about the blossoms of the trees, are doing us the same service in their own way.

'Perhaps there is no bird which is considered more decidedly wanting in principle than the woodpecker; and, certainly, so far as man is concerned, there is none more conscientious. So long as a dead tree can be found for her nest, he will not trouble himself to bore into a living one; whatever wounds he makes upon the living are considered by foreign gardeners as an advantage to the tree. The sound tree is not the object; he is in pursuit of insects and their larvæ. In South Carolina and Georgia, forests to a vast extent have been destroyed by an insect, which would seem as capable of lifting a tree as of destroying it. The people were alarmed by the visitation, and sagaciously laid the mischief at the door of the woodpecker, until they found that they had confounded the bailiff with the thief.

'The injury arising from the loss of a single crop is hardly to be estimated. The experience which is taught us by our own misfortune is very dearly bought; and we think that if we can derive it from others,—if, for example, we can learn from the ornithologists the means of preventing such injury, as in many instances we may,—the dictates of economy combine with those of taste, and warn us not to neglect the result of his researches.'

It was remarked by colonel Powel, that 'instead of being regaled by the whistling robin and chirping bluebird, busily employed in guarding us from that which no human foresight or labor is enabled to avert, our ears are assailed, our persons are endangered, our fences are broken, our crops are trodden down, our cattle are lacerated, and our flocks are disturbed by the idle shooter, regardless alike of the expensive attempts of the experimental farmer, or of the stores of the laboring husbandman; whilst all the energies of his frame and the aim of his skill are directed towards the murder of a few little birds, worthless when obtained. The injuries which are immediately committed by himself and his dogs are small compared with the multiplied effects of the myriads of insects which would be destroyed by the animals whereof they are the natural prey.'

BUSHES. In many parts of our country, the pasture grounds are infested, and often overrun with noxious shrubs; this is the most slovenly part of our husbandry, and ought to be cured.

Eradicating them, says Deane, requires so much labor, that farmers are most commonly content with cutting them once in a few years. But the more cuttings they survive, the longer lived they are apt to be, and the harder to kill, as the roots continually gain strength.

It is undoubtedly true, that cutting bushes in the summer will do more towards destroying them than doing it in any other season, particularly in August. Other circumstances being equal, the wettest weather is best for destroying shrubs by cutting. Spreading plaster on ground where bushes have been cut may tend to check their re-sprouting, by encouraging the growth of grass.

It is said to be a good method of destroying bushes, to cut them with hoes close to the surface, when the ground is frozen hard; and that more may be destroyed in a day in this way than in the usual method of cutting with a bush-scythe.

Bushes which grow in clusters, as alder, &c., may be expeditiously pulled up by oxen; and this is an effectual way to subdue them.

Elder is considered harder to subdue than almost any other kind of bush; mowing them five times in a season, it is said, will not kill them. The roots of the shrub-oak will not be killed but by digging them out.

To destroy bushes in swamps, flooding two or three summers is the most approved method. But if this is not convenient, draining will so alter the nature of the soil, that the shrubs which it naturally produced before will not be any longer nourished by it; and one cutting may be sufficient.

After all, extirpation, by digging them out, and by fire, is cheapest and most effectual.—*Farmer's Guide.*

IRRIGATION. The following is from the *Transactions of the Essex Agricultural Society.*

Dr. Spofford's Essay on Irrigation. I feel some apology is due to the trustees for my long delay in fulfilling the appointment with which I was honored by them at their meeting in September, 1830; and have only to say that it was occasioned by a desire to obtain from a friend, then at a distance, some account of an experiment on a larger scale than any other which has come to my knowledge in this part of the country.

Some degree of knowledge of what constitutes the food of plants seems indispensable to any well-conducted system of producing them in the greatest perfection; and such knowledge seems most likely to be obtained by minutely examining their structure, and carefully observing the manner of their growth.

Plants constitute one of the great divisions of organic life, and one formed or constituted by systems of fibres and vessels, and endowed with certain powers and appetences which place them at a greater remove above unorganized matter than they are below animal life; and appropriate nourishment is elaborated, and a complete circulation is carried on to the minutest extremity, in a manner extremely analogous to the circulation which is carried on in the arteries and veins of the most perfect animals; and the apparent intelligence with which plants seek for nourishment, light, air, and support, appears in some instances to bear a strong resemblance to perception and knowledge; and the circulation of fluids in the vessels of plants and animals appears to be carried on much on the same principles, and is perfectly involuntary in both.

The indispensable agency of *water*, in constituting the fluids, and carrying on the circulation in these systems of vessels, has been universally acknowledged; and could not be overlooked by the most careless observer, while he saw innumerable instances in which plants wither and dry for want of this substance. But while this universal agency has been acknowledged, it is believed that a very inferior office has been assigned to it from that which it really performs. It has been considered as the mere vehicle which carried and deposited the nutritious particles of other substances, while it in reality was contributing much the largest portion of the actual nourishment to the plants which annually clothe our earth in living green.

If this idea is correct, then he who possesses water at his command with which to supply his plants at pleasure, or who has a soil adapted to attract and retain moisture in suitable quantities, possesses a mine of inexhaustible wealth, from which he can draw at pleasure, in proportion to his industry and his wants.

In proof of the abstract principle that water constitutes in a very large proportion the food of plants, I may be allowed to mention one or two accurate experiments of distinguished philosophers upon the subject, which appear to me to be quite decisive on the case.

'Mr. Boyle dried in an oven a quantity of earth proper for vegetation, and after carefully weighing it, planted in it the seed of a gourd; he watered it with pure rain water, and it produced a plant which weighed fourteen pounds, though the earth producing it had suffered no sensible diminution.'

'A willow tree was planted by Van Helmont in a pot, containing a thousand pounds of earth. This plant was watered with distilled water or pure rain water; and the vessel so covered as to exclude all solid matter. At the end of five years, upon taking out the plant, he found it had increased in weight one hundred and nineteen pounds, though the earth had lost only two ounces of its original weight.'

The experiments of Mr. Cavendish and Dr. Priestley have sufficiently proved that vegetables have the power of decomposing water and converting it into such fluids as they need for circulation in their own vessels; and that they elaborate from this substance such juices and fruits as they are by nature calculated to produce.

The great effect which is so frequently observed to follow the formation of ditches from the road-sides on to mowing-ground, is, no doubt, in part, to be attributed to the manure which is thereby washed on to the ground, but is also in part owing to the more copious supply of water which it thereby receives.

That pure water is capable of producing similar effects I have the following experiments to prove:

Several years ago, when resident with my father on his farm at Rowley, I labored hard to divert a stream, which fell into a miry swamp, from its usual course across a piece of dry upland. The stream was pure spring water, which issued between the hills about fifty rods above, running but just far enough to acquire the temperature of the atmosphere, but without receiving any more fertilizing quality than was obtained in passing through a pasture in a rocky channel; the effect, however, was to double the quantity of grass. The same stream I again diverted from its course about forty rods below, after it had filtered through a piece of swamp or meadow-ground, and with the same effect; and again, still lower down its course, I succeeded in turning it on to a piece of high peat-meadow, which had usually produced but very little of any thing; and the effect was, that more than double of the quantity of grass was produced, and that of a much better quality. I was led to this latter experiment by observing that a strip of meadow which naturally received the water of this run, and over which it spread for several rods in width without any particular channel, was annually much more productive than any other part of the meadow.

But the best experiment, and on the largest scale of any which I have known, was made by my late father-in-law, deacon Eleazar Spofford, then resident at Jaffrey, New Hampshire. A letter from Rev. Luke A. Spofford, in answer to my inquiry on this subject, observes: 'My father commenced the experiment as early as the year 1800, and continued it till 1820, or to the time when he sold his farm. The last ten years of his time he flashed perhaps twenty acres; and it produced, I should think, twice as much in common seasons, and three times as much in dry seasons, as it would have done without watering. This land would hold out to yield a good crop twice as long as other land of the same quality,' (that is, I presume, without flowing.) 'In dry weather he watered it every night, and the produce was good, *very good.*'

I am acquainted with the lot of land which was the subject of this experiment. It is a northern declivity, and rather a light and sandy soil, on the eastern bank of Contoocook river; and the water used was that of the river, about one mile below its formation by the junction of two streams, one from a large pond of several hundred acres in Rindge, and the other a mountain stream, formed by innumerable springs issuing from the skirts of the Monadnock.

From the foregoing premises may we not conclude, that water performs a more important office in the growth and formation of plants than has generally been supposed, and that it not only serves to convey nourishment, but that it is itself elaborated into nourishment, and thereby constitutes the solid substance? and we may farther conclude, that every farmer should survey his premises, and turn those streams which now are often useless or hurtful on to lands where they are capable of diffusing fertility, abundance, and wealth.

It appears, farther, that the immense fertility of Egypt is not so much owing to the alluvial deposit brought down by the annual inundation, as to the canals and reservoirs in which the waters are retained, to be spread over the lands during the succeeding drought, at the will of the cultivator.

If, according to the experiments of Boyle and Van Helmont, almost the whole food of plants is derived from water, then the principal use of the various manures is to attract moisture and stimulate the roots of plants to absorb and elaborate it; and we have also reason to think that lands are much more injured and impoverished by naked exposure to heat and wind, and washing by water that runs off and is lost, than it is by producing abundant crops.

In the present state of population, nothing more could be expected or desired, than that every farmer should make use of such means as the small streams in his vicinity may afford; but in a densely peopled country, like Egypt in former ages, or China at present, it should doubtless be one of the first enterprises of a good government to take our large rivers above their falls and turn them off into canals for the benefit of agriculture.

JEREMIAH SPOFFORD.

WOOD-LAND, ground covered with wood or trees. They are mostly designed for fuel and timber. In felling them care should be taken to injure the young growth as little as possible. Firewood, as well as timber, should be felled when the sap is down; otherwise it will hiss and fry upon the fire, and not burn freely, although it should be ever so long dried. To thicken a forest, or to increase the number of trees in a wood lot, it should be well fenced, and no cattle be permitted to be in it. And something may be done, if needful, by layers and cuttings.—*Deane.*

The practice of the populous nations of Europe, whose forests have been cut off centuries ago, and who are compelled to resort to measures of the strictest economy to supply themselves with fuel, ought to have great weight with us. France, in an especial manner, ought to be looked up to for wise lessons on this subject. Her vast and thickly settled population, her numerous manufactures, her poverty in mineral coal, the eminence which she has attained in all economical arts, entitle her to great respect. It is the practice of the French people not to cut off their woods oftener than once in twenty or twenty-five years, and by *law*, when they are cut over, the owner is obliged to cut the *whole smooth*, with the exception of a very few trees, which the officers of the government had marked to be spared for larger growth. Without giving any opinion as to the propriety of the direct interference of the government on such a topic, we should say that the example proves that in the opinion of the French scientific and practical men, it is expedient when wood-lands are cut that they should be cut smooth, in order that the new growth might start together, not overshaded by other trees of larger growth. We have no favorable opinion of the utility of cutting down trees in a scattered manner, as they appear to fail, and still less of planting acorns in thinner spots of the forest. The growth thus produced must remain forever feeble.—*Lowell.*

A valuable paper by the Hon. John Welles, republished in the New England Farmer, vol. i. page 329, from the Massachusetts Agricultural Repository, recommends cutting hard wood trees between forty and fifty years of age; and the writer states that 'though trees may shoot up in height by standing longer, yet the period of the most rapid vegetation is mostly over, and by this means much of the undergrowth is necessarily destroyed.' Mr. Welles is of opinion that in cutting over a wood lot to obtain fuel, it is best to take the whole growth as you proceed. He observes that 'we have been condemned as evincing a want of taste in cutting off our forests without leaving what it would take half a century to produce,—a shade near where it is proposed to erect buildings. The fact is that trees of original growth have their roots mostly in the upper stratum of earth, and

Cleansing the Bark of Fruit Trees.—This operation should be performed in arly spring as well as in midsummer.—'he rough loose parts of the bark should be craped off, as well as moss, and other paraites. The bark should then be covered with ie following mixture, as high as the operaor can reach, with an ordinary long handled hite-wash brush: five pounds whale oil oap, one pound fine salt, one pound fine nd, two pounds potash, two ounces nitrate soda, dissolved or mixed with water to ie consistency of cream, and thoroughly rubed upon the bark.—*Working Farmer.*

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INSECTS. It would far transcend our limits to give even a brief description of the various sorts of insects which injure gardens, cultivated fields, &c., and destroy the best productions of our soil. We shall, therefore, confine ourselves to stating, briefly, some of the most approved modes of counteracting the ravages and effecting the destruction of a few of those which are most injurious to the cultivator.

The preventive operations are those of the best culture, in the most extensive sense of the term, including what relates to choice of seed or plant, soil, situation, and climate. If these are carefully attended to, it will seldom happen that any species of insect will effect serious and permanent injury. Vegetables which are vigorous and thrifty are not apt to be injured by worms, flies, bugs, &c. Fall ploughing, by exposing worms, grubs, the larvæ of bugs, beetles, &c. to the intense frosts of our winters, is very beneficial. Insects may be annoyed, and oftentimes their complete destruction effected, by sprinkling over them, by means of a syringe, watering-pot, or garden engine, simple water, soap-suds, tobacco-water, decoctions of elder, especially of the dwarf kind, of walnut leaves, bitter and acrid herbs, pepper, lye of wood ashes, or solutions of pot and pearl-ashes, water impregnated with salt, tar, turpentine, &c.; or they may be dusted with sulphur, quicklime, and other acrid substances. Loudon says, 'Saline substances, mixed with water, are injurious to most insects with tender skins, as the worm and slug; and hot water, where it can be applied without injuring vegetation, is equally, if not more powerfully, injurious. Water heated to one hundred and twenty or one hundred and thirty degrees will not injure plants whose leaves are expanded, and in some degree hardened; and water at two hundred degrees or upwards may be

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near the surface. A tree acts upon its roots and is acted upon by the wind, sustaining in common with the whole forest the force of this element, and it becomes accommodated or naturalized to its pressure. But when left alone or unsustained, it is borne down by the first gale, often to the injury of property and even of life.' The Farmer's Assistant likewise says, 'if woods are old and decaying the better way is to cut all off, as you want to use the wood, and let an entire new growth start up, which will grow more rapidly.'

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The Rev. Mr. Falconer, one of the correspondents of the Bath Agricultural society, strongly recommends soap-suds, both as a manure and antidote against insects. He observes, that 'this mixture of an oil and an alkali has been more generally known than adopted as a remedy against the insects which infest wall fruit-trees. It will dislodge and destroy the insects which have already formed their nests and bred among the leaves. When used in the early part of the year, it seems to prevent the insects from settling upon them.' He prefers soap-suds to lime-water, because lime soon 'loses its causticity, and with that its efficacy, by exposure to air, and must, consequently, be frequently applied; and to the dredging of the leaves with the fine dust of wood ashes and lime, because the same effect is produced by the mixture, without the same labor, and is obtained without any expense.' He directs to make use of a common garden-pump for sprinkling trees with soap-suds, and says, if the water of a washing cannot be had, a quantity of potash dissolved in water may be substituted; and that the washing of the trees with soap-suds twice a week, for three or four weeks in the spring, will be sufficient to secure them from aphides, &c.

Other modes of counteracting the effects of insects are pointed out in treating of the plants which are most liable to be injured by them. We shall, however, make some remarks on a few of those which are most common and injurious to the interests of the cultivator.

Canker-worm. We shall not attempt to give either a description or the natural history of the canker-worm, but refer to professor Peck's Memoir on the subject, (which was originally published in the Massachusetts Agricultural Repository, and republished in the New England Farmer, vol. v. p. 393,) and direct our attention exclusively to the remedies which have been used or suggested to preserve fruit-trees from this formidable enemy.

The female of this insect comes out of the ground late in the fall, early in the spring, or, sometimes, during a period of mild, open weather in winter. Those which rise in autumn or in winter are less numerous than those which ascend in spring; but, being very prolific, they do much injury. One method of preventing the ravages of the worm is to bar the ascent of the females up the stem of the tree. This has generally been attempted by *tarring*, of which there are several modifications:

1. A strip of linen or canvas is put round the body of the tree, before the females begin their ascent, and well smeared with tar. The insects, in attempting to pass this barrier, stick fast and perish. But this process, to complete the desired effect, must be commenced about the first of November, and the tarring continued when the weather is mild enough to permit the worms to emerge from the ground, till the latter end of May, or till the time of their ascent is past. It is necessary to fill the crevices in the bark with clay mortar, before the strip of linen or canvas is put on, that the insects may not pass under it. Having put on the strip, which should be at least three inches wide, draw it close, fasten the ends together strongly, then tie a thumb-rope of tow round the tree, close to the lower edge of the strip. The design of this is to prevent the tar from running down the bark of the tree, which would injure it. It should be renewed in moderate weather, once a day, without fail. The best time is soon after sunset, because the insects are wont to pass up in the evening, and the tar will not harden so much in the night as the day.

2. Another mode of tarring is to take two pretty wide pieces of board, plane them, make semicircular notches in each, fitting them to the stem or body of the tree, and fasten them together securely at the ends, so that the most violent storms may not displace them. The crevices betwixt the boards and the tree may be easily stopped with rags or tow; then smear the under sides of the boards with tar. The tar, being defended from the direct rays of the sun, will hold its tenacity the longer, and, therefore, need not be frequently renewed. The trees in this way will be less liable to be injured by the drippings of tar by leaving a margin of two or three inches on those parts of the boards which are next to the trees, to which no tar is applied.

3. A gentleman informs us, that in Plymouth, Massachusetts, they make use of the following mixture as a substitute for tar in preserving fruit-trees against canker-worms, viz.:

White varnish, soft soap, and whale oil, one-third of each to be mixed and applied as tar is usually. This mixture is not soon hardened by the weather, and does not injure the trees. Another simple mode of preventing the ascent of the insects is to wind a band of refuse flax or swingle-tow round the tree, and stick on the band burdock or chestnut burs set so closely together that worms cannot pass between them.

The Massachusetts Agricultural Repository, vol. iii. No. 4, contains some remarks on the canker-worm, by the Hon. John Lowell, president of the Massachusetts Agricultural society, from which the following is extracted:

'I had the turf dug in around sixty apple-trees, and the earth laid smooth. I then took three hogsheads of *effete*, or air-slacked lime, and strewed it an inch thick round my trees, to the extent of two or three feet from the roots, so that the whole diameter of the opening was from four to six feet.

'I tarred these trees as well as the others, and although I had worms or grubs on most that were not limed, I did not catch a single grub where the trees were limed.

'I do not speak with confidence. I am, however, strongly encouraged to believe the remedy perfect. It was ascertained by professor Peck, that the insect seldom descended into the ground at a greater distance than three or four feet from the trunk, and to the depth of four inches, or that the greater part come within that distance. The lime is known to be destructive of all animal substances, and I have little doubt that it actually decomposes and destroys the insect in the chrysalis state; at least I hope that this is the case.

'There are many reasons which should encourage a repetition of this experiment. The digging round the trees is highly useful to them, while tarring is very injurious. The expense is not great. A man can dig round fifty trees in one day. The lime is a most salutary manure to the tree. After the spot has been once opened and limed, the labor of keeping it open will not be great. Three hogsheads of air-slacked lime, or the sweepings of a lime-store, will suffice for fifty trees, and will cost three dollars. As it is done but once a year, I think it cannot be half so expensive as tarring.

'I repeat it, that I mention my experiments with great diffidence, as being the first of my own knowledge. It may induce several persons to try it in different places, and where trees are surrounded with others which are treated differently.

All I pray is, that it may prove successful and relieve us from this dreadful scourge, which defaces our country, while it impoverishes and disappoints the farmer.'

The remedies proposed by professor Peck were, 1st. Turning up the ground carefully in October, as far as the branches of a tree extend, to half a spade's depth, or five inches, so as completely to invert the surface. A great number of chrysalids would thus be exposed to the air and sun, and of course destroyed. 2dly. Breaking the clods, and smoothing the surface with a rake, and passing a heavy roller over it, so as to make it very hard, and without cracks. In grass grounds the sods should be turned with the grass side down, and placed side by side, so as to be rolled. The winter's frosts would heave and crack a smooth surface, but it might be smoothed and hardened by the roller, or by other means, in March, with much less trouble, time, and expense, than rolling requires. As lime, when slacked, is reduced to an impalpable powder, and is thus well adapted to close the openings in the surface, Mr. Peck was inclined to think its good effects are produced this way as well as by its caustic qualities.—*Thacher's Orchardist*, p. 93.

John Kenrick, Esq., of Newton, Massachusetts, proposed, between the time in June after the worms had disappeared and the 20th of October, to take the whole of the soil surrounding the trees, to the extent at least of four feet from the trunk, and to a suitable depth, and cart it away to a distance from any trees which the canker-worms are in the habit of feeding on ; and returning an equal quantity of compost or rich earth intermixed with manure.

A writer for the *New England Farmer*, vol. iii. p. 327, states a case of an orchard having been preserved from canker-worms by means of a large number of locust-trees, equal to about double the number of apple-trees.

Mr. Roland Howard, of Easton, Massachusetts, observes, (*N. E. Farmer*, vol. iv. p. 391,) that 'a quantity of lime was collected from the sweepings of a lime-store, and spread on the ground around a certain apple-tree, some time in the month of November; (the foliage of which tree had been destroyed by the canker-worm the preceding summer ;) the ground being in a pulverized state, the lime was spread as far from the trunk of the tree as the drippings from the branches extended : the effect was stated to be the entire disappearance of the worm, and an increased vigor of the tree.' The same writer observes, that 'moving the earth with a plough or hoe late in November, or beginning of December, has been found very efficacious in destroying them.' This last mentioned remedy, if it will always prove efficient, will probably be the cheapest and most expedient. But the worm must be capable of enduring a considerable degree of cold, or unerring instinct would not lead it from its dormitory in November (as it frequently does) to brave the rigors of winter on the stem or branches of the tree. We are inclined to believe, as well as to hope, that the application of lime, as above stated, will prove effectual; and if so, it will probably be preferable to any mode of applying tar, or attacking the enemy above ground.

When the insects have ascended, their numbers may be lessened by jarring or shaking the body or limbs of the tree, causing them to suspend themselves by the threads which they spin from their bodies, and striking them off with a stick. It is said that those which thus fall to the earth do not rise again. Whether they would be able to resist the effects of a sprinkling with soap-suds, saline or bitter infusions, &c., is more than we can say; but we wish their powers might be tested by showering them with those mixtures which are found to be the best antidotes against other insects.

Caterpillar. 'This is one of the worst enemies to an orchard when neglected; but easily destroyed by a little attention. In the spring, when the nests are small and the insects young and tender, they never venture abroad in the early part of the day, when the dew is on the trees, or in bad weather; they may then be effectually destroyed by crushing them in the nest. This attention, continued a short time every spring, will destroy those in existence, and will prevent their increase in future years: if left till grown strong, they wander from their nests, and cannot be effectually overcome without great trouble and expense.'—*Coxe on Fruit-Trees.*

The Hon. Timothy Pickering, in a letter to the corresponding secretary of the Massachusetts Agricultural society, has recommended an implement for the destruction of caterpillars. It is made by inserting some hog's bristles between twisted wires, in such a manner as to form a cylindrical brush, which will present bristles on every side. This is attached to a pole of such length as the trees may require, and the caterpillars are brought down by it, and then crushed. Other methods have been proposed, such as casting over the tree a few handfuls of ashes, in the morning before the dew is dissipated from the foliage, or after a shower of rain. A strong whitewash of fresh stone-lime, applied by the means of a mop, or sponge fixed to the end of a pole, strong soapsuds, spirits of turpentine, a little oil of any kind, particularly blubber oil, are likewise fatal to the insects. But, perhaps, the most effectual remedy is the *hand*, by which the insects may easily be removed at an early stage; but if this be neglected, it is thought that the next best remedy is the use of colonel Pickering's brush as above. In applying either of these remedies, care must be taken to choose that part of the day when the caterpillars are in their nests. They rarely quit them till nine o'clock, and generally return to them again about twelve.

Curculio. This is a small bug, or beetle, which perforates the young fruit of the pear, apple, and all stone fruits, and deposits its eggs in them. The eggs soon hatch, and a small maggot is produced, which feeds either on the pulp of the fruit, or on the kernel of the seed; for the tastes and habits of the different species are not similar. In the stone fruits, this injury destroys their growth, and they fall with the little enemy within them. The insect retreats into the earth, and passes the winter in the chrysalis state, and comes forth just as the young fruit is forming, or the petals of the flowers are falling, to renew its mischievous labors. This insect continues its depredations from the first of May until autumn. Dr. James Tilton, of Wilmington, Delaware, in an article on this subject, published in the American editions of *Willich's Domestic Encyclopedia*, observes that 'our fruits, collectively estimated, must thereby be depreciated more than half their value;' and adds, in his directions for destroying the insect, 'all the domestic animals, if well directed, contribute to this purpose. Hogs, in a special manner, are qualified for the work of extermination. In large orchards, care should be taken that the stock of hogs is sufficient to eat up all the early fruit which falls from May till August. This precaution will be more especially necessary in large peach orchards; for otherwise, when the hogs become cloyed with the pulp of the peach, they will let it fall out of their mouths, and content themselves with the kernel, which they like better; and thus the curculio, escaping from their jaws, may hide under ground till next spring.'

'The ordinary fowls of a farm-yard are great devourers of beetles. Poultry in general are regarded as carnivorous in the summer, and therefore cooped some time before they are eaten. Every body knows with what avidity ducks seize on the tumble-bug, (*scarabæus carnifex*,) and it is probable the curculio is regarded by all fowls as an equally delicious morsel. Therefore it is that the smooth stone fruits, particularly, succeed much better in lanes and yards where poultry run without restraint, than in gardens and other inclosures, where fowls are excluded.'

Instead of turning swine into orchards, to pick up the fruit which falls, and thus destroy the worms which it contains, it will often be found most expedient to gather such fruit, and give it to swine in pens, &c., either raw, or, what would be better, boiled. If such measures were generally taken with fruit which falls spontaneously, as to prevent the insects, which generally cause it to drop prematurely, from escaping into the ground, the worms, which destroy one-half our fruit, and very much deteriorate a considerable part of the other half, would soon be extirpated from our orchards and fruit-gardens.

Aphis, Plant-louse, Puceron, or *Vine-fretter*. 'This genus of insects comprises many species and varieties, which are so denominated from the plants they infest. The males are winged, and the females without wings; they are viviparous, producing their young alive, in the spring; and also oviparous, laying eggs in autumn. Water, dashed with force from a syringe, [or garden engine,] will prove as destructive to them as any thing, when on trees; and smaller plants may be washed with lime-water, with tobacco-water, with elder leaves infused in water, or with common soap-suds, any of which will destroy the insects.'—*Loudon*. 'Tie up some flour of sulphur in a piece of muslin, or fine linen, and with this the leaves of young shoots or plants should be dusted, or it may be thrown on them by means of a common swan's-down puff, or even a dredging box. Sulphur has also been found to promote the health of plants, on which it was sprinkled, and that peach trees, in particular, were remarkably improved by it.'—*Domestic Encyclopedia*. 'In green-houses, they are readily destroyed by the smoke of tobacco, or of sulphur; but in the open air, fumigation, though much in vogue many years since, is of no avail. The best remedy is the simplest. Soap-suds, forcibly applied, will, after one or two applications, effectually destroy them, without apparent injury to the plant.'—*Deane*.

A writer for the *New England Farmer*, vol. iii, p. 9, after stating a number of experiments with soap-suds, for destroying aphides, which were unsuccessful, or but partially succeeded, says, 'I was led to conclude, that it is not sufficient to wet the upper side of the leaves, thinking to make them disagreeable or poisonous to the insect, but that they must be well drenched or immersed in the suds. I therefore applied again the same remedy; but with this difference—instead of sprinkling the upper side of the branches, I carried a pailful of suds from tree to tree, and, bending the tops of small trees, and the branches of larger ones, immersed all the parts infested with lice, holding them in the liquor for a moment, that none might escape being well wet. On examining the trees the next day, the greater part of the lice were destroyed. It was found necessary to repeat the same process once or twice, with suds not too weak, say about two or three ounces of soap to a gallon of water.' Another writer in the same paper, page 10, says, 'I have applied soap-suds to my apple-trees, in order to kill the lice. It will be sufficient for me to say, that just sprinkling them with suds will not kill them; neither will dipping the branches which are infested with them kill them. But dipping and holding them in as long as I can conveniently hold my breath, will destroy every one. The suds do not appear to injure the leaves. I tried suds made on purpose, and suds which had been used for family washing. The latter answers the purpose much the best.' It is possible to make soap-suds so strong as to kill the tender branches, as well as the insects which infest them. The proportion above mentioned, of two or three ounces of soap to a gallon of water, is probably most advisable.'

Cut-worm. This is an ash-colored worm, with a stripe almost black on its back. When fully grown it is about the size of a goosequill, and about an inch and a quarter in length. They are very apt to cut off young cabbages, cauliflowers, beets, &c. They never voluntarily appear on the surface of the ground in the day time, but may be found about an inch below it. In the night they make their excursions, cut off the stems of young plants just at the top of the ground, and again bury themselves.

Dr. Deane observed, 'I once prevented their depredations in my garden, by manuring the soil with sea-mud, newly taken from the flats. The plants generally escaped, though every one was cut off in a spot of ground that lies contiguous. From the success of this experiment, I conclude that salt is very offensive or pernicious to them. Lime and ashes, in some measure, prevent their doing mischief; but sea-water, salt, or brine, would be more effectual antidotes. The most effectual, and not a laborious remedy, even in field-culture, is to go round every morning, and open the earth at the foot of the plant, and you will never fail to find the worm at the root within four inches. Kill him, and you will save not only the other plants of your field, but, probably, many thousands in future years.'

There is some danger, in making use of salt, brine, or sea-water, of injuring the plants in attempting to destroy insects; and we should, therefore, generally prefer decoctions of elder, walnut leaves, or tobacco. Mr. Preston, of Stockport, Pennsylvania, preserved his cabbage-plants from cut-worms by wrapping a hickory-leaf round the stem, between the roots and leaves.—*New England Farmer*, vol. iii. p. 369. The Hon. Mr. Fiske, of Worcester, Massachusetts, in speaking of this insect, says, 'To search out the spoiler, and kill him, is the very best course; but as his existence is not known except by his ravages, I make a fortress for my plants with paper, winding it conically and firmly above the root, and securing it by a low embankment of earth.'—*New England Farmer*, vol. iv. p. 362.

Lice on Apple-trees. There is a species of insect infesting apple-trees which may be styled the *bark louse*, to distinguish it from the *plant louse*, or *aphis*. It is, in form, like half a kernel of rye, but much smaller, with the flat side sticking to the bark of the tree. Jesse Buel, Esq., of Albany, gives the following statement of his mode of destroying them: 'In June last, I observed directions in the *New England Farmer* for destroying the parasitic enemy; and, that being the particular time to make the application, I immediately set about it. For this purpose, I took eight parts of water and two of soft soap, and mixed with these lime enough to make a thick whitewash. With a whitewash and paint brush I put this upon the trunks and limbs of trees, as high as was practicable, filling the cracks in the bark, and covering the whole surface. The effect has been not only to destroy most of the lice, but to give the trees an improved and vigorous appearance. The outer bark, which, from a stinted growth, had become rough and hard, has, in a measure, fallen off in flakes, and disclosed a soft, smooth bark, the sure indication of health.'

Apple-tree Borer. (*Saperda bivitata.*) The scientific description of this very pernicious insect is thus given by professor Say, of Philadelphia: 'Hoary; above, light-brown, with two broad white fillets. Inhabits the United States. *Body*, white; *eyes*, fuscous; a small spot on the vertex, and another behind each eye, light-brown; *antennæ*, moderate, slightly tinged with bluish; *thorax*, light brown, with two broad, white lines, approaching before; *elytra*, light-brown, irregularly punctured; a broad, white, longitudinal line on each, nearer to the suture than to the outer edge. Length, from one-half to seven-tenths of an inch. A very pretty insect. In the larvæ state, it is very injurious to the apple-tree, boring into the wood.'—*Journal of the Academy of Sciences, Phil.* vol. iii. p. 409.

Professor Say, in a letter to Jesse Buel, Esq., says, 'You state that it leaves the pupa, and becomes perfect in the latter part of April, and that the eggs are deposited beneath the surface of the soil. These two circumstances ascertained, I would recommend the application, early in May, or the latter part of April, of common bricklayer's mortar, around the base of the tree, so as to cover completely the part, and its immediate vicinity, where the deposit is made. This preventive was successfully employed by Mr. Shotwell against the attacks of the peach-tree insect, (see *American Farmer*, vol. vi. p. 14,) and I see no reason why it should not be equally efficacious in the preservation of the apple-tree.'—*Memoirs of the New York Board of Agriculture*, vol. iii. p. 479.

The *Massachusetts Agricultural Repository*, vol. v. p. 360, contains a paper on this insect, by John Prince, Esq., by which it appears that worms of this kind are got rid of by 'digging round the tree, and clearing away the earth to the roots, and then with a sharp-pointed knife, a chisel, or a gouge, and a small wire to probe, if they are deep in the tree, they may easily be destroyed.' After taking out the worms the wounds should be covered over with grafting-clay and a large proportion of dry wood ashes mixed, and the earth then returned to the tree. The process for cleansing the trees from borers should be performed in the spring, as soon as the frost is out of the ground, or at least before the month of June, as the perfect insect escapes before that time.

Slug-worm, or *Naked Snail*. These reptiles appear on the leaves of fruit-trees in the month of July. Professor Peck has ascertained that they are the progeny of a small black fly, which deposits its eggs in the leaf in the months of May and June. They may be destroyed by means of lime, sprinkled over the leaves in the form of powder. For this purpose a wooden box of convenient size, having its bottom perforated with numerous small holes, is to be filled with lime. This being mounted on a pole and shaken over the tree, distributes the lime among the leaves, and the slugs are immediately destroyed. The labor is very trivial; a man may cover a large tree in three or four minutes; and the desired effect is certain. Fine earth shaken through a basket or perforated box will answer as well.

'Another remedy, it is said, will prove equally effectual. It is a strong infusion of tar, made by pouring water on tar, and suffering it to stand two or three days, when it becomes strongly impregnated. This, if sprinkled over the leaves by means of an engine, will kill these vermin instantaneously. A strong decoction of tobacco will probably produce the desired effect, and tanner's bark put round the tree, it is said, will have a salutary tendency as a preventive.'—*Thacher's Orchardist.*

Forsyth recommends watering the ground where these insects are with soap-suds and urine, mixed with tobacco-water. Ducks admitted into a garden will destroy all within their reach.

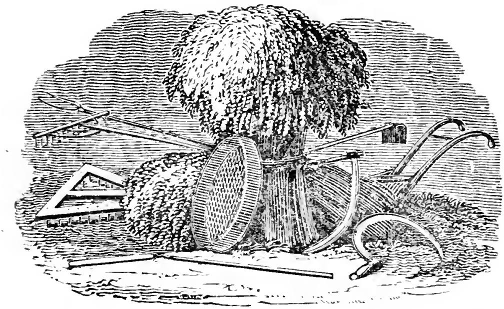
Wire-worm, or *Red-worm*. This insect is slender, and usually about an inch long, with a hard coat, and a pointed head. Mr. William Moody, of Saco, (Maine,) in a communication to Hon. Josiah Quincy, published in the *Massachusetts Agricultural Repository*, vol. iv. p. 353, observes, 'I am persuaded, from experience, that sea-sand, put under corn or potatoes with manure, or spread on the land, will go far, if not wholly, to the total destruction of these destructive worms, on which nothing else seems to have any effect. It has a beneficial effect spread on land before ploughing, or even after land is planted with corn or potatoes, not only to destroy the wire-worm and other insects, but to increase the crop. With my neighbors a load of sea-sand is considered as preferable to a load of the best manure, to mix in with their common barn manure, or to spread on their gardens and low flat land.'

Probably sea-mud or sea-water would produce good effects as preservatives against this and other insects.

Soaking seed corn in a solution of copperas in water, has been found effectual against this insect. See page 32 of this work.

The *Striped Bug*, or *Yellow Fly*. This is a small insect of the *coleoptera* order, or such as have *crustaceous elytra*, or wing cases, like the beetle. The elytra of this bug are striped with yellow and black. They prey on the young plants of cucumbers, melons, squashes, and others of the *cucurbitaceæ* species. 'These insects may be considerably thinned by killing them in a dewy morning, when they have not the free use of their wings, and cannot well escape. But nothing that I have tried has proved so effectual as sifting or sprinkling powdered soot upon the plants when the morning dew remains on them. This forms a bitter covering for the plants, which the bugs cannot endure the taste of.'—*Deane* 'We would recommend sprinkling the plants with a little sulphur or Scotch snuff.'—*Farmer's Assistant*. But the surest defence against these insects is, inclosing the plants with a frame, and a muslin or gauze covering.

For able and scientific descriptions of most of the insects which infest our fields and gardens, we would refer to a '*Discourse* delivered before the Massachusetts Horticultural Society, by Thaddeus W. Harris,' published in the New England Farmer, vol. xi. p. 204, and following pages.



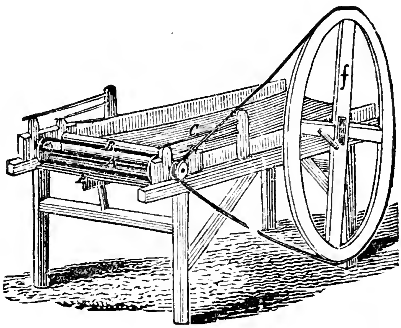
AGRICULTURAL IMPLEMENTS.

It was remarked by Sir John Sinclair, that the introduction of new agricultural implements into a district is often a matter of the greatest difficulty, owing to the ignorance, the prejudice, and obstinacy of farm servants and laborers. Many farmers, therefore, very absurdly retain their old implements, though convinced of their inferiority, rather than sour the tempers of their laborers by attempting to introduce new ones; in many cases however they have succeeded by attention and perseverance, and by rewarding their laborers many new and valuable implements have been brought into general use.

The farmers of New England are too enlightened, and have too much regard for their own best interest, to be under the dominion of such profitless prejudices. Accordingly, we find not only a very increasing demand for new and improved agricultural machines, tools, &c., but that our practical farmers see that it is for their interest to procure the best.

It is now about ten years since the agricultural warehouse was first established in Boston, 51 and 52 North Market street, J. R. Newell proprietor, and which has become so extensive and of so much importance to the community, as to induce the proprietor to continue and extend it in all its various branches for the accommodation of the practical and scientific farmer, by the introduction of new and useful implements of husbandry, and to furnish the best tools for his business.

An establishment of this kind not only answers the above purpose, but serves as a depository in which the inventive artisan may place his articles for sale. The proprietor does not hesitate to say that among the variety of articles on hand at this establishment many are far superior in their form and construction, and far better adapted to the purpose for which they are intended, than any others which have been in use in this country.



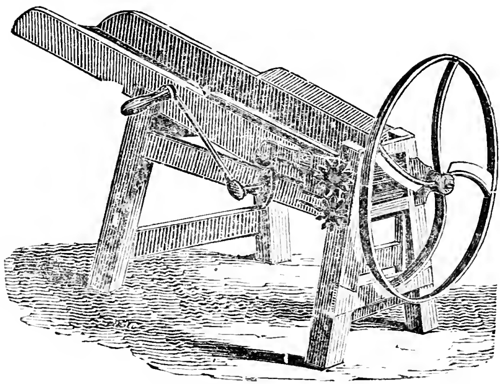
Thrashing Machines. Pope's improved thrashing machine was invented by the late Joseph Pope, Esq., of Hallowell, Maine, and has been in successful operation in different parts of the country for many years, and is found to be the best operating machine for all kinds of grain that has been in use; it is well adapted for getting out rice.

Flagg's Thrashing Machine. This machine, invented by David Flagg, of New York, is very simple in its construction, and not liable to get out of order; works free and easy, and is in very general use in the western part of the state of New York, and much approved of, as likewise his portable horse power, to which the thrashing machine is attached.

Hale's Thrashing Machine. Hale's newly invented rice and grain thrashing machines are found on trial to be the most thorough and effective implements we have had in operation for the purpose intended; it is a very simple operating machine, and powerful and quick in its motion; does the work well, separates and cleans the grain at the same time. This machine must be to the rice planter an indispensable implement; it requires but one man and a horse to work it.

Marsh's Boring Apparatus, which is used to great advantage in boring for water. In using this apparatus much labor and expense is saved in sinking wells and reservoirs, and a great supply of the best water is obtained. While boring, an iron tube is sunk to any depth you please, until a sufficient quantity of water is procured. This mode of procuring a good and a sufficient quantity of the best water is used to great advantage in low marshy ground, and even if surrounded by tide water.

By this mode of boring, good water may be obtained in the middle of the ocean.



Straw Cutters. The straw cutter is a machine well worth the attention of every farmer, and should be in common use with every person feeding stock; and from the great improvement and simplicity of the machines now in use, the work is done with great expedition and facility. It is a subject of great regret to every friend of the agricultural interest, that these machines are not in more general use. Every farmer who is disposed to use fodder to the best possible advantage, and preserve his animals in the best health, in all cases cuts his fodder. For farther explanation of the profits and advantages arising from cutting fodder, the following statement is given:

Mr. Benjamin Hale's account of the savings made by the use of Straw Cutters, employed to cut Hay and Straw as Fodder for Horses.

Mr. Hale is proprietor of a line of stages running between Newburyport and Boston. He says,

	Tons.	*cwt.*	*qrs.*	*lbs.*
The whole amount of hay purchased from April 1 to Oct. 1, 1816, (six months) and used at the stage stable, was	32	4	0	10
At twenty-five dollars per ton, (the lowest price at which hay was purchased in 1816,)				$800 00
From Oct. 1, 1816, to April 1, 1817, whole amount of hay and straw purchased for, and consumed by the same number of horses, viz.:				

	T.	cwt.	qrs.	lbs.	Cost.
Straw	16	13	3	10	$160 23
Hay	13	14	1	00	350 00
					$510 23

Deduct on hand April 1, 1817, by estimation, four tons more than there was Oct. 1, 1816, at twenty-five dollars per ton, 100 — $410 23

Saving by the use of the straw cutter, four months of the last six months, or the difference in expense in feeding with cut fodder and that which is uncut, — $389 77

Whole amount of hay used for the horses of the Salem stage, twenty-five in number, from April 1 to Oct. 1, 1816, viz.:

T.	cwt.	qrs.	lbs.
22	0	0	0

At thirty dollars per ton, (the lowest price in Salem,) — $660 00

Whole amount consumed by the same number of horses, from Oct. 1, 1816, to April 1, 1817,

	T.	cwt.	qrs.	lbs.	Cost.
Straw	15	13	0	0	$187 80
Hay	2	15	0	0	81 00
					$268 80

Saving in using chopped fodder five months, — $391 20

Total saving in using the straw cutter nine months, viz.: at Newburyport, four months, — $389 77

At Salem, five months, — 391 20

Total, $780 97

The members of the board of trustees of the Massachusetts Agricultural society, to whom the above account was communicated by Mr. Hale, were informed by that gentleman, that he used no more grain from Oct. 1816, to April, 1817, than was used from April, 1816, to Oct. 1816.

Remarks.—There is not only much saving and gain in cutting fodder when hay is low, but the animal is kept in better health, more particularly old horses, and such as may have been injured in their wind.

It is a fact that horses will live and continue serviceable much longer when fed on cut fodder. The machine invented and manufactured by Willis, known as '*Willis' improved Straw* *and Hay Cutter,*" is the most durable and best operating machine that has come to our knowledge; and what is worthy of notice, they require but one person to operate them, which is not the case with many other machines; in this there is a great saving in cutting feed, and likewise the fodder may be cut of any length required; the knives being placed in front of the machine can be at all times examined and kept in good order. The feeding rollers are so constructed that while the machine is in the act of cutting, the rollers cease to feed, which renders the cutting operation very easy.

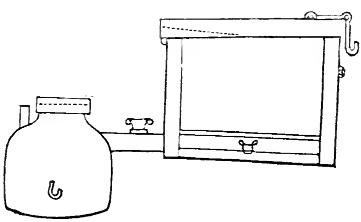
Eastman's Straw Cutter, with improved side gearing and cylindrical knives. This machine is well calculated for large and extensive establishments. Price, fifty to sixty dollars.

Willis' Vertical Straw and Hay Cutter. It is well constructed, made of the best materials, and of the best workmanship. Fed and worked by one man, works free and easy, and not liable to get out of order. It will cut from thirty-five to forty bushels per hour. Price thirty-five dollars. For the cost, this is the best machine in use.

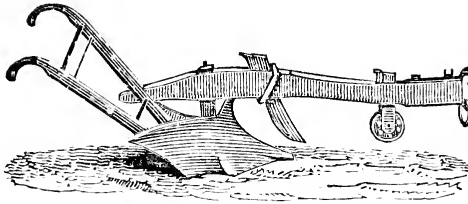
This is to certify, that I have used Willis' improved straw cutter the past season, and consider it the best machine for the purpose now in use. NATHAN ADAMS.

The Common Dutch Hand Cutting Machine, is one of those implements in common use, and known to every practical farmer; and is considered as good a machine for a small establishment as any in use. Will cut from ten to twenty bushels per hour.

Safford's Improved and Common Straw Cutter, with side gearing; well approved, and is in very general use.



Root Steamer. The above cut represents a root steamer, described in the Farmer's Magazine, (a work printed in Scotland,) vol. xviii. page 74, and alluded to in page 54 of the present work. It consists of a boiler, and wooden chest or box placed over it or near it. The box may be of any size, and so placed as to be supplied and emptied by wheel and hand barrows in the easiest manner, either by the end or top, or both, being made to open. 'If the box is made eight feet by five and three deep, it will hold as many potatoes as will feed fifty cows for twenty-four hours, and these may be steamed in an hour.'



Ploughs. This implement, one of the oldest and most useful employed on a farm, has undergone of late years a wonderful change in all its most essential parts, and has been greatly improved. The cast iron plough is now most generally used among the best farmers, and considered decidedly the best. Among the different ploughs now made of cast iron, Howard's stands unrivalled. They have been used at the different cattle shows and ploughing matches, and have in all cases been approved by them. At the Brighton cattle show at the exhibition in October, 1832, they received the premium of ten dollars, awarded as being the best plough presented.

[Extract from the Report of the Committee.]

'The ploughs were all of cast iron, and by six of the most approved manufacturers. The one by Mr. Charles Howard, of Hingham, was a superior implement, considerable improvements having recently been made by him, in making the mould-board longer than usual, and swelling the breast of the share, so as to make every part bear equally; by which means the plough runs more true and steady, is always free from carrying forward any earth, and wears perfectly bright; and being made on mathematical principles, he informed the committee he could make the different sizes always the same.'

JOHN PRINCE,
EBENEZER HEATH,
JOHN BAKER, 3d.

'The duty of awarding a premium "to the plough which shall be adjudged best of all those used at the ploughing match," devolved on the *two committees*, and they agreed unanimously to award it to Mr. Charles Howard, of Hingham, for his new and improved plough; ten dollars.'

GORHAM PARSONS,
Chairman of Single Teams.
JOHN PRINCE.
Chairman of Double Teams.

Tice's Plough. This plough is considered the next best plough to Howard's; it has taken a number of premiums at the different ploughing matches, and is highly approved by all those who have used them, as they turn a good furrow, leaving the sod smooth and level.

Side-hill Plough. This plough, for which a premium was given at Brighton, is found to be a very great improvement on the ploughs now in use, for working on side-hills. The mould-board is so constructed as to shift on each side, as may be required, by turning on the under side of the plough as the team turns at each end of the furrow.

Howard's Improved Double Mould-board Plough. This plough is well calculated for furrowing out land, splitting hills, ploughing between corn, potato, and vegetable cultivation, to great advantage. A great labor saving machine; saves nearly all the hoeing of corn or potatoes.

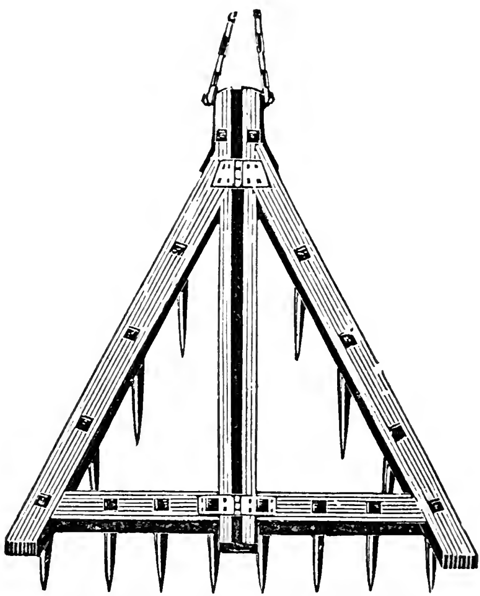
Bigelow's Plough. This plough is made of wrought iron, and is in general use, and very much approved, being very strong and quite light; does the work well with little labor.

Morse's Plough. Similar to Bigelow's, but a better made article.

Cary and Warren's common Wood Plough. Of all sizes.

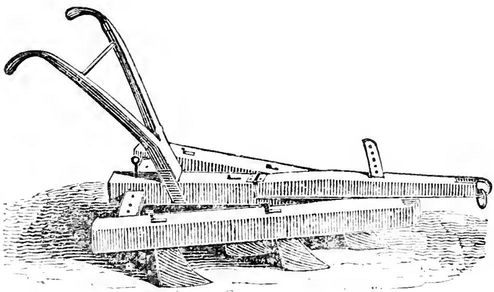
Shovel Plough, and Plough Scrapers. Of all sizes, made to order at the shortest notice.

Quaker Hand Plough. For gardens, a very useful implement, and used to great advantage in garden cultivation. Steel pointed.



Chandler's Improved Double Harrow. This harrow is so constructed as to be in two parts, and joined together by hinges on two straight centre pins, so that one part can be raised and swung over on the other half as occasion requires. Its advantage over the common harrow is, that it is less liable to be stopped, as one side may be elevated or turned to a perpendicular position, while the other side proceeds horizontally; it may thus be drawn nearer to rocks, trees, &c. It will likewise better adapt itself to ridges, hollows, and uneven land.

Haricott's Road Harrow. Ox and horse harrows, of all sizes, fixed and expanding.



Cultivators. Howard and Seaver's patent fixed and expanding cultivators, of all sizes. The cultivator is an implement that is coming into very general use in all parts of the country, and serves in a great measure in lieu of hoeing. The teeth are so constructed as to raise the ground, and leaves it very light and free for cultivation, and at the same time destroys the weeds; and is well adapted to southern and western cultivation.

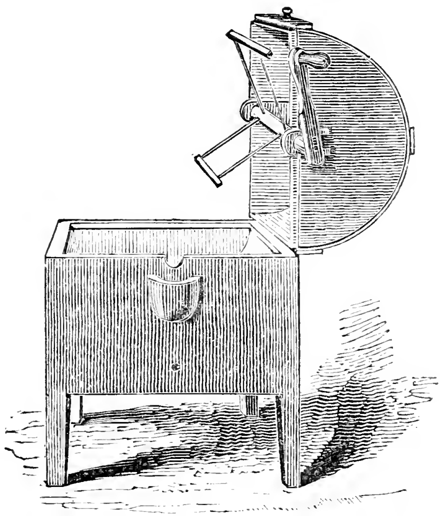
These cultivators are adapted to all kinds of ground, for running through rows of corn, potatoes, and vegetables of all kinds; and used in the cultivation of hops, instead of the plough and hoe, and are found far superior to either. It is likewise well adapted to harrow in grain and grass seed; and for the many uses to which this implement may be applied, it must be considered one of the most valuable tools that is used on a farm, and is coming into very general use.

This certifies that I have used Seaver's cultivator, and find it a much better article to work among corn and potatoes, than any machine that I have ever tried; it clears the weeds between the rows much more effectually than either a plough or harrow, and saves a great deal of labor.

Framingham, 1834. BENJ. WHEELER.

Tree and Bush Pullers. The tree and bush puller is one of the most useful and effective implements in use; it is employed in clearing land of under brush, small trees, barberry and other bushes. It is of iron, of any size or dimensions required, something in the form of a rake or claw, with the teeth much bent. The ground is loosened around the tree or bush which is to be removed. The teeth or claws are entered on one side, a horse or oxen are attached by a chain to the claw and drawn on the opposite side. One man and horse or one yoke of oxen will do more work with this implement than five men can do without it in digging and clearing land.

Broad-Cast Machine. Bennet's broad-cast machine. This machine, which is designed for sowing broad-cast, is found, when used on smooth and even ground, to answer a good purpose, sows very regular and even, and is used with great despatch.



Gault's Patent Churn, which has been in use for several years, is the most approved and convenient churn now in use. The particular advantage is the facility with which it can be worked. From its quick and powerful motion it will produce the greatest quantity of butter from the same quantity of cream; is easy to clean, and no way liable to get out of order.

MR. FESSENDEN, *Editor of the New England Farmer.*

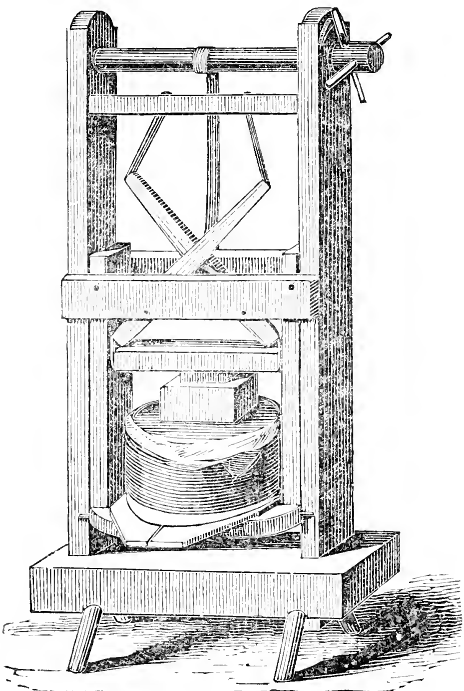
SIR—In answer to the inquiry respecting the Gault's churn which I purchased at the agricultural warehouse, I give it as my decided opinion, that they are the best churns I have ever seen in use. They are very convenient to keep clean, bring the butter very easy, and require not more than fifteen to twenty minutes to do a churning.

Respectfully yours, B. REYNOLDS.

Sharon, June 15, 1829.

Stone Churn. A small article, well calculated for small families.

Tree Brushes. Pickering's improved wire brushes are found to be the most effective implements for the purpose of clearing trees and destroying caterpillars, of any thing that has ever been used. This brush, which is made in a spiral or taper form, and about eight inches long, is fixed on the end of a pole, the small part of the brush is entered into the webs, and a moderate twist of two or three turns takes the web and all connected with it clear from the tree. It should be used very early in the morning and late in the afternoon, when the insects are in their nests.



Cheese Presses. Quakers' improved self-governing cheese-press. The press is so constructed as to govern and regulate itself, in pressing a cheese of any size, without any weights.

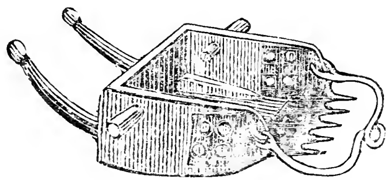
Leavett's Improved Cheese Press, which is so constructed that seven or fourteen pounds weight will press any common sized cheese.

Cheese Hoops, different sizes.

Cheese Cloths.

Curd Mills, for cutting cheese curds, which facilitates the labor of the dairy.

Lactometers. This invention is found to be of great utility and advantage in testing the quality of cream given by each cow. It consists of a small mahogany frame which contains four or six glass tubes of ten inches in length and half an inch in diameter. These tubes are divided into tenths, and numbered from one to ten, which show the quantity of cream given by each cow. This little article is found very useful, and is much used in large dairies.



Davis' Improved Patent Dirt Scraper. This road or dirt scraper, invented by Shadrock Davis, is used to great advantage in removing dirt or gravel, more particularly in stony lands, from the peculiar construction of the points, which are similar to those of a plough point. They enter the ground very free and easy, fill and discharge themselves, and are easily managed by one horse or a yoke of oxen. Ploughing is unnecessary where these shovels are used.

We the undersigned hereby certify that we have used Davis' patent plough-pointed road and dirt scraper, and we consider it a great improvement on the common road scraper, and can with confidence recommend it to the public, as being superior to any implement of the kind we have ever used, particularly in sandy and stony land, being so constructed as to load itself without the use of ploughing, which is common in using the old-fashion dirt scraper. We consider it one of the greatest labor-saving implements to the road-maker that can be used, and as such we fully recommend it to the public.

ABM. WASHBURN, *Bridgewater.*
HENRY S. PACKARD, *North Dartmouth.*
BRADFORD HOWLAND, *South Dartmouth.*

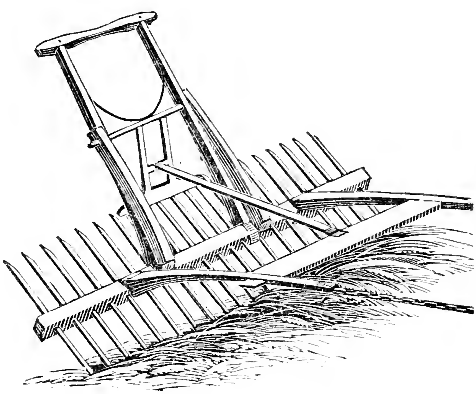
Beatson's Scarifier. These implements, which are very generally used in Europe, and the southern states, are well calculated for free cultivation, are much approved in pulverizing the land, leaving the soil light and fine.

Pruning Shears. This article, which was formerly made by Wakefield of Gardener, has since been very much improved, and is now considered as one of the best and most approved implements in use, and has taken the place of the pruning knife; and for grape vines and small trees is considered much the best, as upon an easy drawing stroke it cuts very smooth and fair, without injury to the bark or wood.

Scythes. Farwell's patent cast steel concave scythes, which are found, from the peculiar form and shape in which they are made, to cut upon the principle of a drawing stroke, and are very easily ground and kept in good order, and are considered the best scythes that are manufactured. From the peculiar construction of these scythes the edge is always left true in the middle of the scythe.

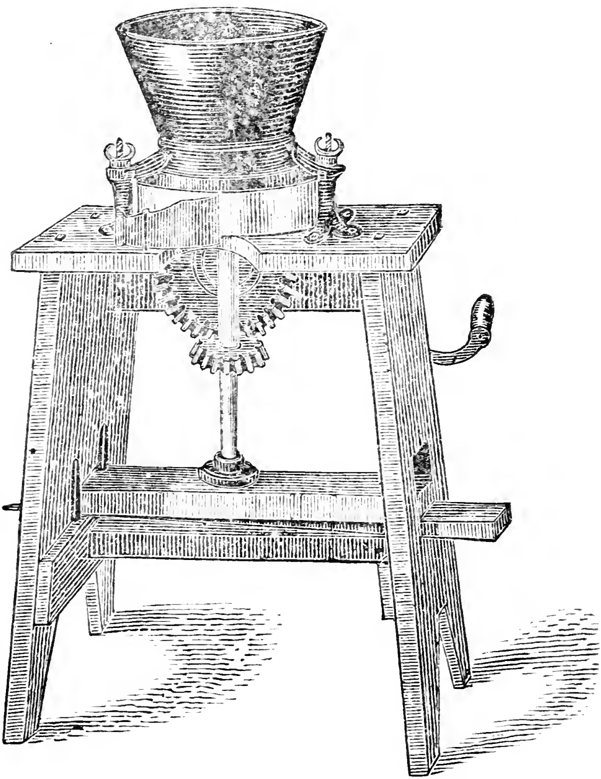
Scythe Rifles. Austin's and Derby's rifles are considered the best articles made for the purpose. They are about the size of the common sand rifle, are cased with fine emery, and give a very sharp and good edge. They are of very general use, and good substitutes for the scythe stone.

Scythe Snathe. This article, though in very common use, has been altered and improved to great advantage within a few years past. The snathes manufactured by Vickery Baker for the proprietors of the agricultural warehouse are found to be the most approved and best calculated to work free and easy. The regular quick turn at the heel, and the strong and substantial iron rings which secure the scythe and nibs, are considered a great improvement in those snathes.



Discharging and Revolving Horse Rake. The discharging horse rake is a very plain and simple operating implement. It is so constructed as to load itself, by raising the teeth a little, and the horse drawing it forward when filled so far as to form a winrow of sufficient size; a slide is then pressed forward, which discharges the hay. By raising the rake we pass the first winrow and commence a second, and thus continue until we pass over the field.

The revolving rake which has been in general use in most parts of Pennsylvania and New Jersey, is found to be one of the most useful and labor-saving machines now in use. One man and horse, with a boy to lead, will rake on an average from ten to fifteen acres per day with ease, and do the work well. They are coming into very general use in all parts of the country, and will no doubt in a few years supersede the use of the common hand rake.



Harris' Improved Paint Mill. This mill can be used by hand, horse, or any other power that it may be attached to, and works to great advantage. From the very plain and simple manner of its construction, it is easily taken to pieces and cleaned, and shifted from one place to another, and used with great facility, and is considered one of the best and most useful mills in use.

CERTIFICATES FOR HARRIS' PAINT MILL.

I the undersigned hereby certify that I have used Harris' improved patent paint mill, purchased at the agricultural warehouse, Boston, and consider it the best and most convenient mill for the purpose intended of any I have ever used. It is very readily cleaned and put in order.

Hingham, Feb. 20, 1834. SETH B. CUSHING.

I the undersigned do certify that I have used one of Harris' paint mills for grinding a variety of paint for about two years, and do not hesitate to give it the preference to every other mill I have ever used. THOMAS B. WESTERN.

Ware, May 26, 1834.

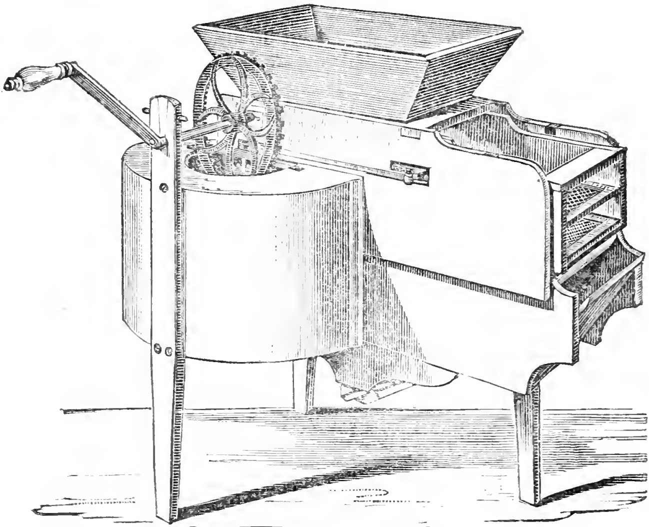
I hereby certify that I have been in the paint business for fifteen years, and have used different kinds of paint mills, and have not found any so good as Harris' patent mill. I have ground with one of these mills one hundred pounds of lead in two hours. I. BARTLETT.

I have used one of Harris' patent paint mills for grinding small colors for some time past, and find it the best mill for the purpose in use. GEORGE YENDELL.

Boston, June 20, 1834.

Willis' Patent Brass Syringe. This syringe is intended for watering all kinds of green-house and out-door plants, and for preserving grape vines from mildew, and has been used with a solution prepared for that purpose, with great success. See the following recipe:

Take a pint and a half of sulphur, and a lump of the best unslacked lime; put these in a vessel of about seven gallons measurement; let the sulphur be thrown in first, and the lime over it; then pour in a pail of boiling water, stir it well, and let it stand half an hour; then fill the vessel with cold water, and after stirring well again, allow the whole to settle; after it has become settled dip out the clear liquid into a barrel, and fill the barrel with cold water, and it is then fit for use. You next proceed with a syringe holding about a pint and a half, and throw the liquid with it on the vines in every direction, so as to completely cover foliage, fruit, and wood; this should be particularly done when the fruit is just forming, and about one-third the size of a pea, and may be continued twice or thrice a week for two or three weeks. The whole process for one or two hundred grape vines need not exceed half an hour.



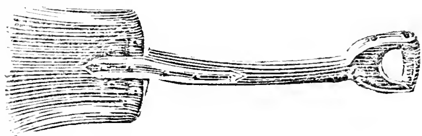
Winnowing Machines. Holmes' improved winnowing machine is one of the best that is in use. It is very plain and simple in its construction, and very powerful in its operation; is well calculated for cleaning all kinds of grain, and may be applied to many other purposes, such as cleaning rice, coffee, &c.

Elliot's patent horizontal mill is for the same purpose. Though smaller and more compact, is found equally as good; is considered as an improvement on the common winnowing machines now in use. The motion of the flyers is horizontal, and the sieves have a forward and backward motion.

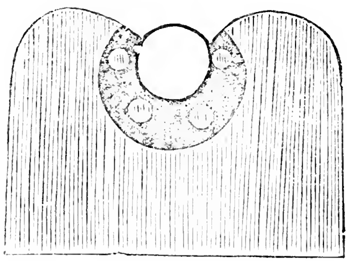
Grain Cradles. This article, like the scythe snathe, has undergone a very great alteration and is much improved; they are made much lighter, the fingers or arms are secured by braces of suitable sized brass wire, regulated by screws in such a manner as to be let in or out as circumstances may require. The scythe is well secured, and finished in a superior manner, and made of the best cast steel.

Cast Steel and Common Axes. This very common article among our farmers is one of the most useful implements ever invented. Colins and Morgan's cast steel axes have been considered as the best, and most approved in form and shape, and are warranted in every respect to be of the best quality. They are finished in the most perfect manner, and ground to a fine smooth cutting edge.

Hatchets, cleavers, and many other tools, made by different workmen, and finished in the same manner.



Cast Steel Shovels and Spades. Ames' improved Cast Steel back Strapped Shovels and Spades are very superior in every respect to the common iron and steel shovels. They wear much longer, continue brighter, more sharp, and are used with great ease. This article, though one of the oldest and most common implements in use, has been much improved. Also a great variety of other kinds of spades and shovels, made by different manufacturers. Irish shovels and spades with long handles.



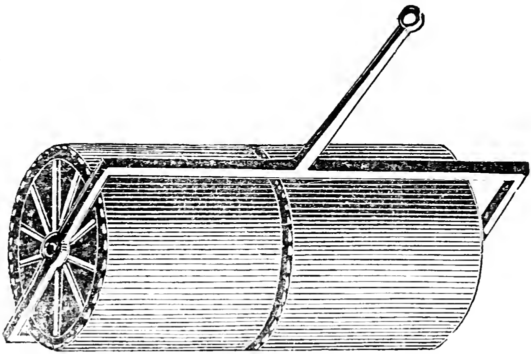
Hoes. Great improvement has been made in this article of late. A great variety of hoes are now manufactured, of different forms. Those made by Morgan are considered the best now in use; they are made of the best of steel, crooked neck, and socket handles.

The Prong or *Potato Hoe* is one of the most useful, simple, and improved implements that is employed. It was invented and used in the first instance for digging potatoes; it was afterwards found as useful for planting as for digging them, and likewise is used for almost every purpose for which a hoe has been used; and they are employed to the greatest possible advantage in stony or rocky lands, and in planting new land; they are likewise used as a garden hoe, being one of the best implements a gardener can have in use, or in working between rows of vegetables, digging round young trees, loosening the ground, &c.

Lord Vernon's New Tillage Hoe. The utility of this garden hoe will be duly appreciated upon trial. Few gardeners or nursery men employed in gardening will be without them when once they have been used. They are employed to great advantage in deep tillage; in many cases they are superior to digging or forking the land.

Bill-Hook. This article is much used in England in pruning and clearing brush, and is a good tool as a substitute for the pruning saw and chisel, and can be used with more expedition.

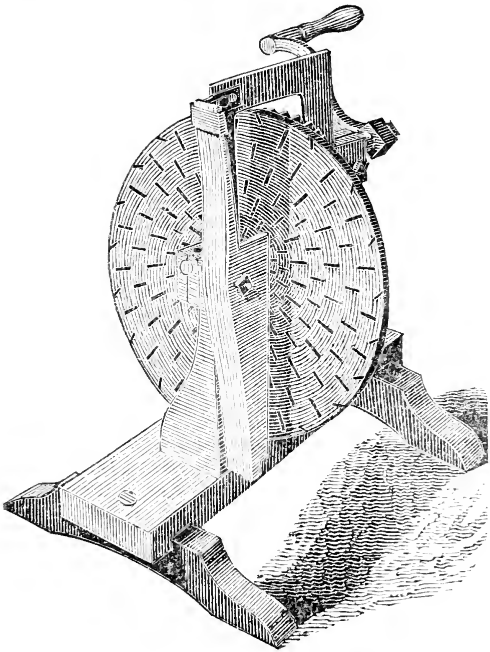
Glass Covers for Plants. These covers are used for covering plants—protecting them in their growth and preventing mildew.



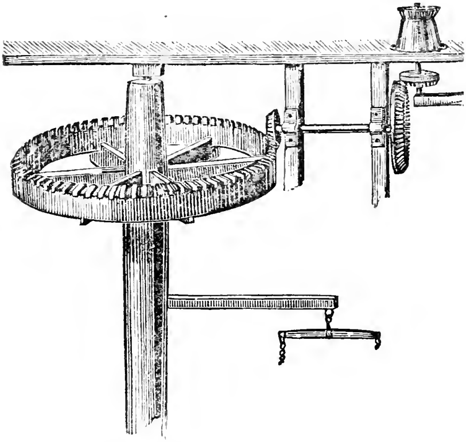
Garden and Field Rollers. E. Phinney, Esq., of Lexington, has made great and successful use of the roller for grass land, and has given a description and dimensions of what he considers the most convenient and best proportion, viz.: The rollers to be six feet in length and five feet in diameter, placed on an iron axle of the same length by one inch and a half in diameter; the roller to be made of oak or any hard wood plank, each plank to be about four inches wide and two and a half thick; the roller is made in two parts, of three feet each; each end of the axle is secured in a frame which is made of joist, of a suitable size to receive the end of the axle; to this frame is attached the shafts in which the horse is, or a tongue to which the oxen are attached, which completes the rollers.

Mr. Phinney says this sized roller presents the following among other advantages, viz.: If the ground is very mellow the large sized roller presses the small stones more directly into the ground and renders the surface more regular and even; the large roller also moves easier, and the weight falling more directly upon the small stones, they are, as he has before observed, better pressed into the earth, the lumps of earth more finely broken, and the surface left much smoother. For garden rollers or gravel walks the stone or iron rollers are prepared, of different sizes.

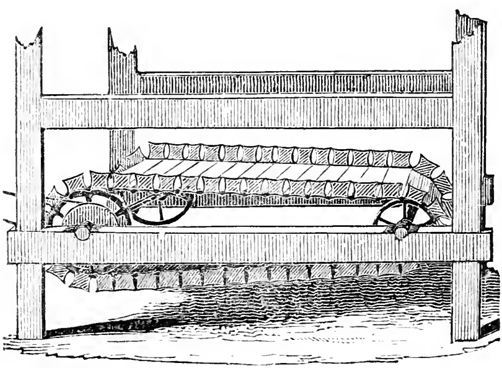
Grass and Edging Shears. These shears are for the purpose of edging banks and slopes, for trimming and keeping the banks in good order, and the oftener they are used the more thrifty and thick the grass will grow.



Corn Sheller. A corn sheller is one of the most convenient and labor-saving implements that the practical farmer has in use. Various machines for this purpose have been invented. The most improved and best adapted for common use are those of Harrison, with the patent vertical wheel. It can be employed in all cases for large or small sized ears. It is very simple in its construction and durable in its operation, and no way liable to get out of order; one man can work it to good advantage, though a man to turn and a boy to feed it works it much better than one alone. In this way it will shell ten to twelve bushels per hour. They are so light and portable as to be easily removed from place to place, and one machine will serve for several families, or even the inhabitants of a small town.



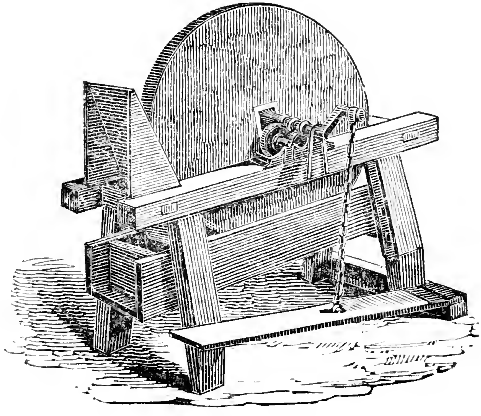
Willis' Stationary Horse Power, and Corn Cracker Attached.
Corn and Cob Cracker. This mill, which is calculated for grinding cob and corn together, is found to make the best provender and the most economical food for fattening hogs or horses. It is so constructed as to be used with a common grist mill or separate, as circumstances may require, and may be worked by a single horse or any other power. From thirty to forty bushels per hour have been ground in these mills.



Willis' and Hale's improved Portable Horse Power, may be worked by one or more horses, mules, or oxen. As every farmer keeps more or less of these animals, no additional expense is required in working these powers. They are calculated to propel any kind of machinery or agricultural implements in common use, such as thrashing machines, cider mills, corn and cob mills, straw and hay cutters, corn shellers, grindstones, winnowing machines, &c.; they are likewise well adapted for machine shops, in working the circular or web saw, turning lathes, or any machinery where power is required. The alterations and improvements made in this power render it very simple in its construction and easy in its operation, and not liable to get out of order when properly made. They occupy but the small space of nine feet by two, and are easily removed; they are truly labor-saving machines, and must come into general use with farmers and mechanics. They are likewise well adapted for the use of plantations, being calculated for working saw or roller gins, and other purposes to which they may be applied; they are so portable as to be transported at a moderate expense, and may be put in operation by any person of common capacity.

Bark or Plaster Mills. The Troy bark and plaster mills. These mills are altered and much improved from the old-fashioned mill which has been in use for many years.

Family Hand Mills. Willis' improved patent family or plantation mill, calculated for grinding corn, coffee, &c., has a small balance wheel which regulates its operation and causes it to work free and easy.



Grindstones on Friction Rollers. Grindstones of different sizes hung on friction rollers and moved with a foot treader, are found to be a great improvement on the present mode of hanging grindstones. The ease with which they move upon the rollers renders them very easy to turn with the foot, by which the labor of one man is saved; and the person in the act of grinding can govern the stone more to his mind by having the complete control of his work. Stones hung in this manner are coming daily more in use, and wherever used give universal satisfaction. The rollers can be attached to stones hung in the common way.

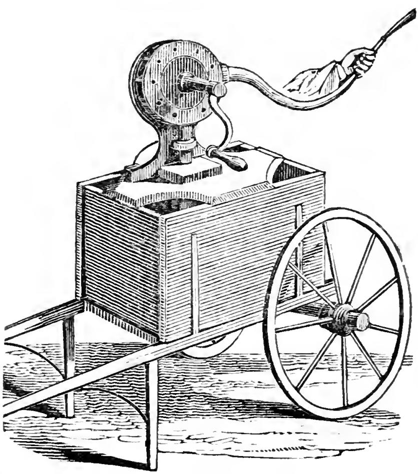
Hay Knives. These knives are for the purpose of cutting the hay in the mow, and are a desirable article for that purpose, and almost indispensable where hay is stacked in the yard; and the farmer would wish to spend his hay to the best advantage.

Peat Knives, for cutting peat; an article which is daily increasing in use for fuel, and in many parts of our country is found in great abundance, and if cut at a suitable season of the year, is used to good advantage.

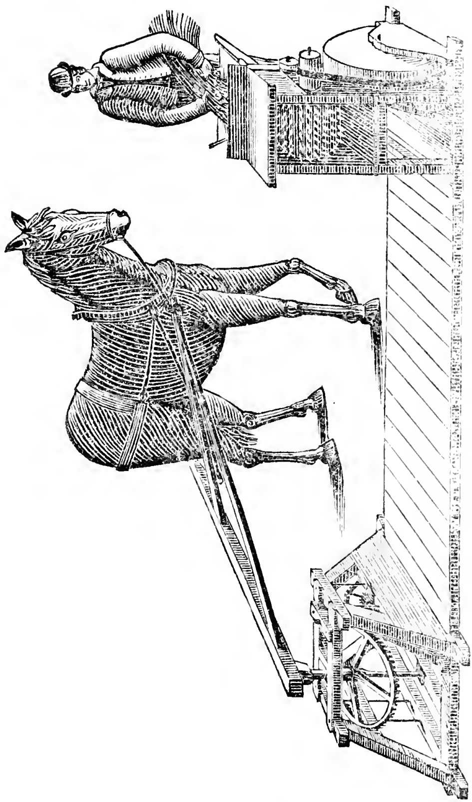
Pomace Knives. These knives are almost indispensable in a cider country.

Ditching Knives, for ditching Low Lands.

Cast Steel Edging and Trimming Knives. These knives are calculated for edging and trimming grass-plats, borders, &c.; are found to be one of the most convenient tools a gardener can have in use.



Kendall's Improved Rotary Pump. This pump, which is a great improvement upon the various rotary pumps now in use, is very plain and simple in its construction, and no way liable to get out of order; but works with great facility, throws a constant and regular stream by a very simple operation of a crank, and is calculated for all kinds of domestic purposes, as well as for green-houses, factories, &c. There are different sizes of these pumps manufactured, which are so constructed as to answer as forcing pumps in such a manner as to carry water to any distance, and are a good substitute for an engine.



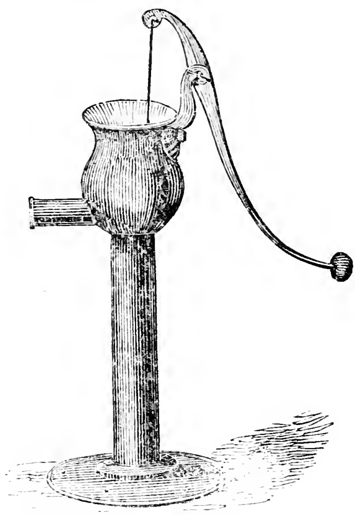
Flagg's Thrashing Machine and Horse Power. This machine, invented by David Flagg, of New York, is very simple in its construction, and not liable to get out of order, and is in very general use in the western part of the state of New York.

Zinc Hollow Ware, either for culinary use or the dairy, by wholesale or retail, may be had at the agricultural warehouse.

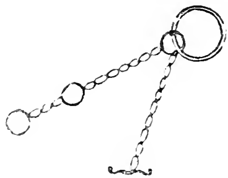
The proprietor is sole agent for vending the above wares. The prices of this ware will, upon examination, be found not to vary materially from that of tin and iron, yet as durable as iron, easily cleansed, not subject to rust, giving the article cooked or kept in it no unpleasant taste, and containing in itself no poison like copper, brass, and lead.

Zinc kettles will be found to cook rice, hominy, and all kinds of sweetmeats, better than any other kind of metal, neither discoloring nor varying the flavor of the substance cooked; and for these purposes, it will ere long be substituted for brass and copper, to avoid the poisonous corrosions of those metals.

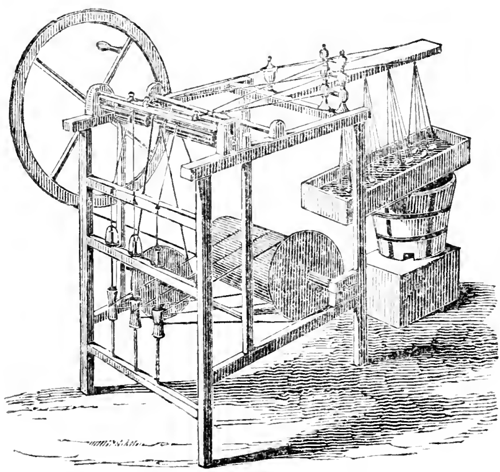
Zinc pans, for the dairy, will be found by the dairy-woman an object worthy of her attention, from these considerations: that they will greatly outlast any other pans, that the same size pans will produce one-sixth more cream or butter, and of a superior flavor; they are more easily cleansed, and will keep milk *sweet* longer by a number of hours. Zinc tubs and firkins will keep butter sweet several days longer in hot weather than those of wood or other kinds of metal. This has been a subject of experiment, and the results safely warrant the statement. Hence families who prefer sweet butter to rancid, will do well to avail themselves of these tubs, for keeping their butter sweet and retaining its flavor.



Scott Keith and Co.'s Improved Cast Iron Pump. This pump was invented by Jesse Reed, of Bridgewater, and proves to be the most simple and best constructed pump that is in use, being made of cast iron, which is considered the best metal which water can pass through; is very durable and cheap. It has metal boxes so constructed, that in raising the handle the lower box or valve is opened, and the water let off, which prevents its freezing. They are so plain and simple in their construction, that they can be put up or taken down by any common workman, and no way liable to get out of order. They are attached to wooden logs or lead pipes, and are well calculated for all domestic purposes.

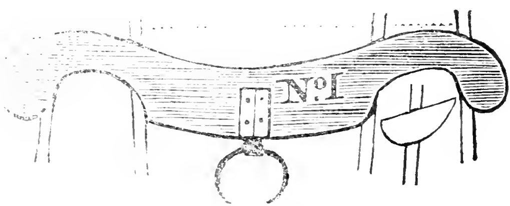


Cattle Chains. These chains have of late been introduced for the purpose of securing cattle to the stall—are found to be the safest and most convenient mode of fastening cows and oxen in the stanchion. They consist of a chain which passes round the animal's neck, and by a ring attached to the stall plays freely up and down, and leaves the animal at liberty to lie down or rise at pleasure, and keeps him perfectly secure.



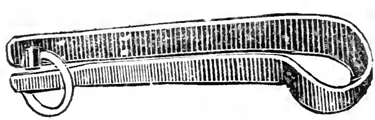
Brooks' Patent Silk Spinning Machine. Brooks' silk spinning and reeling machine, which was invented by himself, is found to be a very simple and easy operating machine, and yet one of the most perfect that has been invented for the purpose of reeling and twisting silk from the cocoons, and manufacturing it into sewing silk. By the different arrangements of this machine, it will operate upon a single or double thread, as may be required, and prepare it for twisting or weaving. Experience has fully proved, that by uniting the filaments of silk as they are drawn from the cocoons, wet in their natural glutinous substance, before they dry, the thread is more firm, smooth, and strong. The simplicity of the machine, and the very easy way in which it is used, bring it within the comprehension and capacity of any person to use it. Mr. Brooks has received a premium for his invention from several societies, and of late a premium and medal from the Scott's legacy, in Philadelphia.

Lightning Rods and Glass Blocks. From the repeated and almost daily occurrences which happen from the effect of lightning, occasioning death and destruction of much property, it is a matter of surprise that every farmer does not have attached to his dwelling-house and barn a lightning rod, and guarded in the best possible manner, which is done by passing the rod through glass blocks which are constructed for the purpose.

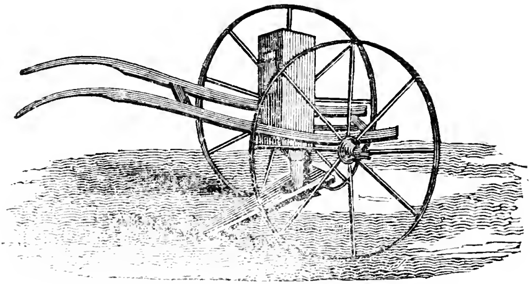


Ox Yokes. Many improvements have been made in this article, and even in the bows and keys.

Brass and Composition Balls. These balls are not only ornamental, but are very useful in preventing the animal from hooking, or being in other respects mischievous and troublesome. They have been in very general use, and add much to the appearance of the animal.



Pomroy's Patent Spring Staple, for securing horses. The improvement in this staple is such that if the horse is cast, or in any way entangled, he can disengage and free himself. Many fine and valuable horses are lost for the want of this self-regulating staple.



Willis' Improved Seed Sower. This machine, which was designed in the first instance for sowing small seed in gardens, is found on using to sow large as well as small seed to advantage, and proves to be one of the best field and garden implements in use. It is particularly adapted for sowing ruta baga, turnip, &c. The saving of seed in the use of this implement is quite sufficient to pay the cost of it in one season, and the seed is sown more regular and even.

Harden's Improved Seed Sowing Machine. This is one of the best labor-saving machines in use, calculated for sowing small seeds in the field or garden.

Carriage Lifter, or levers, for raising wagons, carts, or carriages of all kinds, or for raising loads, pressing goods, &c. Being a small handy implement, it may be taken in a carriage in travelling, and found very convenient and handy for the purpose. Carriage winches and wrenches are likewise very handy and convenient travelling companions, and should always be at hand.

Apple Parer. The apple paring machine is used to great advantage in that part of the country where much attention is given to paring and drying apples for market. This is a small simple machine, which is very convenient for the use it is designed for, and is as much of a time and labor-saving machine as those which are more expensive and complicated.

Patent Curry-Combs, and Brass Teeth Cattle Cards. Patent and common curry-combs, and cards with brass teeth. No stock farm should ever be kept without a good supply of these articles, and constant use being made of them.

Straw Splitters. This little implement, which is plain and simple in its construction, is one of the most useful implements, and should be introduced and used in every family, in town and country.

Saw and Roller Gins. Cotton gins have become the indispensable articles of the cotton planter. A new roller gin has been invented by a Mr. Whittemore, and is coming into very general use; it is readily worked by hand or horse power.

Stamps, of all descriptions, for marking and branding the farmer's tools, of which every farmer who is in the habit of lending and accommodating his neighbors and friends, as all farmers are and must be, should have every tool marked with his name. This prevents the loss of many tools, and much inquiry and trouble among neighbors.

Garden Reels and Lines. Very handy and convenient implements for the gardener in laying out his borders, beds, alleys, &c.

Pruning Chisels and Saws. Of all the implements that are used on the farm there are none used to so much profit and advantage as the pruning knife and saw. Too many of our fruit and ornamental trees are suffered to run to wood; from this circumstance we have less and poorer fruit.

Manure and Hay Fork. No one implement has undergone so thorough an investigation and improvement as the hay and manure fork. Since the first introduction or use of these articles, great improvement has been made in the form of them, and the quality of steel from which they are made. Among the most approved manure forks in use are those of Willis, cast steel, manufactured from one piece, in which no welding is necessary. These forks have been in common use for many years. They are so well tempered as to have that degree of elasticity that they discharge the manure with the greatest ease; they are in no way liable to clog or foul, and are very strong and durable. Unfortunately for this article, there has been great quantities of a very inferior kind made and sold in the form and shape of the true patent ones, which having been made of very poor steel and slighted in the manufacturing of them, has injured the use of this very useful and almost indispensable article.

Budding and Pruning Knives. A great variety of budding and pruning knives are now used, of various forms and shapes: some very superior ones.

Fruit Shears. Those shears which are attached to a pole are for the purpose of taking off fruit from the extreme branches of trees, or such parts as are not to be come at conveniently in any other way. For this purpose they are found to be very convenient and useful; they are likewise used for taking off scions, &c.

Tree Scrapers. This article, which is indispensable in keeping trees in good order, should be used every season in removing the dry and hard bark from trees, to increase a quick and vigorous growth, and keep them in full bearing.

Transplanting Trowels and Forks.

Post Augers and Post Axes. Those two implements are used for one and the same purpose, that of mortising posts.

Pickaxe. A common but very useful article, on an improved plan.

Post Spoons. With this implement and a common crow-bar, posts are set with great advantage and expedition.

Stable Door Hasps, for the purpose of securing barn or stable doors, gates, &c.

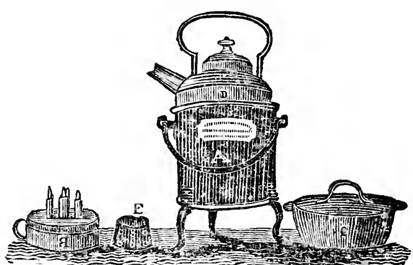
Farnham's Improved Patent Grater Cider Mill. The improvement in this mill is in grinding, or rather grating the apples very fine, so that all the juice is pressed out; and produces a greater quantity of liquor from the same quantity of pomace. The above mills are in extensive operation, and very much approved of. They will grind two bushels of apples per minute, and are in no way liable to get out of order.

With little alteration it can be made one of the best vegetable grinders for grinding or cutting food for animals.

Cider Presses. Presses of different descriptions to correspond with the cider mills.

Vegetable Cutter. Leavitt's improved patent vegetable cutter, for cutting ruta baga, mangel-wurtzel, turnips, &c. Cutting those kinds of vegetables is found to be very beneficial to animals, particularly to milch cows, not only by increasing the quantity, but the quality of the milk. It is a very perfect and complete machine for the purpose.

Willis' Improved Family Sausage Filler. This machine, which is intended for filling sausages, is one of the most convenient and expeditious things for the purpose that can be conceived of. One man will do more in preparing and filling sausages with this machine, than ten men can in the old manner of working them.



Fessenden's Patent Lamp Boiler and Tea-kettle. The lamp apparatus for heating water, &c. here represented, has been found very useful in small families, and such persons as may wish to prepare tea or coffee drink, cook eggs, oysters, &c., in their own apartments, without the trouble or inconvenience of a wood or coal fire. It is very convenient in public houses, coffee-houses, and other places where it is wished to keep any hot liquid constantly on hand. Besides answering all the purposes of what is called the nurse lamp, it may be made to boil from one pint to a gallon of water, by a method which in many cases will be found the most economical and expeditious which can be devised.

Description of the Cut.—[A] Sheet iron case, in which the tea-kettle, boiler, &c. may be placed, removable at pleasure. It has a hole in the bottom to admit the heat of the lamp to pervade the bottom and sides of the boiler. [B] Lamp with five or six wicks, more or less, placed when in use under said case. [C] Pan or boiler, which, when in use, is placed in the sheet iron case. [D] Tea-kettle in its place for boiling. [E] A small sheet iron cylinder, a little tapering, so as to form the frustrum of a hollow cone. This is occasionally placed within the case, so as to surround the hole in its bottom, in order to place upon it a coffee-pot, tea-pot, flask, tin porringer, or other small vessel in which it may be wished to heat water.

Ploughshares. Wrought and cast iron ploughshares of all sizes, fitted and prepared in such a manner as to be at all times ready and fit for immediate use.

Patent and Common Horse Phlemes. The patent phlemes are a very great improvement on the common kind, and in the hands of an experienced and careful person is used with perfect safety, and is very effectual in its operation.

Carter's Patent Guideboard. Made by branding the letters and figures on boards; when done in this manner, are more legible and durable than the usual mode of painting. A full set of letters and figures will be furnished, calculated to answer all the purposes for one town.

Directions for using the Brands.—The brands are to be heated to a cherry red, then applied to the board, and guided by a straight piece tacked on to keep them in a line. The board is then to be lightly planed over, and the white lead applied in the usual manner with a brush. The black letters will not lose their brightness, for the durability of charcoal is well known.

STANLEY CARTER.

Bee-Hives. Dr. Thacher's improved bee-hive, for affording the most effectual security against the ravages of the bee-moth, and keeping the bees dry and comfortable during winter.

Apparatus for transferring Bees. Dr. Barbour's apparatus for removing bees with great facility from one hive to another, without destroying the bees, injuring the honey or the young bees that are in the cells, as they can be transferred to the new bee-hive without difficulty, and the colony increased if desired.

Hay Presses. Since bundle hay has become an article of great merchandise, much use is made of the hay press. There is great improvement in this article, by which hay is pressed much closer and harder.

Hall's Patent Hay Rakes. These rakes are made in a very superior manner to any thing of the kind we have ever seen, and there is as much improvement made in this article as any one article in use.

FARMER'S CALENDAR.

THE following calendar is intended merely as an agricultural prompter, noting that certain kinds of work should be performed about the time in the year specified at the head of each article. The figures refer to the pages in this little volume, in which farther directions may be found relative to the operations which the season in general demands from the diligent, correct, and careful cultivator.

'At the beginning of every month, a good farmer, whether he has or has not a book of this sort, is obliged to reflect on the work he has to perform in that month: he ought to foresee the whole at once, or it is impossible that he should make due provision for its performance. I leave it to any one to judge, if such an estimate of monthly business can be gained so easily without such an assistance to the memory as is afforded by such a calendar; and even if such a work but once in a year gives intimation of some important work which might otherwise have been forgotten, its worth must be acknowledged.'*

The directions in the following pages are intended for the New England states, or about the latitude of forty-two degrees north, and the vicinity, or a small elevation above the sea. Allowance, however, should be made for height above the sea, as well as for situation north or south of any particular latitude; but we believe it not possible to state with any near approach to precision what such allowance should be. The nature of the soil, the aspect, the exposure, the forwardness or backwardness, or what may be styled the general character of the season, are all to be regarded. We will, therefore, not claim precision, where accuracy is not attainable. 'Calendars,' as Loudon has well observed, 'should be considered as remembrancers, never as directories.'

JANUARY.

Stock. If cattle are fed with straw, it should be done with necessary attentions and limitations. The celebrated Arthur Young observed, that 'the best farmers in Norfolk are gene-

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* Young's British Farmer's Calendar.

rally agreed that cattle should eat no straw, unless it be cut into chaff mixed with hay; but, on the contrary, that they should be fed with something better, and have the straw thrown under them to be trodden into dung:' and I am much inclined to believe, that in most, if not in all cases, this maxim will prove a just one. See that your cows are of the best breed. Page 40. Give them roots as well as hay, and they will give you more than an equivalent in milk for their extra keep. Pages 42, 43. Provide pure water for your milch cows, and not oblige them to go a mile, more or less, after it, manuring the highway, and running the gauntlet of dogs, teams, the horse and his rider, the sleigh and its driver, with more annoyances than Buonaparte met with in his retreat from Moscow. See also that the master-beasts do not tyrannize over their weaker brethren, and if any are inclined to domineer, take them into close custody, and deprive them of the liberty of the yard, till they will give indemnity for the past, and security for the future. Cut or chaff your hay, straw, corn-tops, bottoms, &c., with one of Willis' or some other straw cutter, to be found at Newell's agricultural warehouse, No. 52, North Market street, Boston, or some other place. You may also make use of colonel Jaques' mixture, (page 51,) without charge for the prescription. If you give your cows good hay, roots, and comfortable lodging, you may make as good butter in winter as in summer, and become rich by sending to market the product of your dairy. Pages 55, 89, 90, &c.

FEBRUARY.

Attend particularly to cows which have calved, or are about to calve, as well as to their offspring. You know, or should know, what time your cows may be expected to produce their young, by means pointed out page 45, where you may find a recipe for those cows which need to be doctored, that they may stop giving milk. You will find observations on rearing and fattening calves, pages 57, &c. to page 64. Your ewes and lambs will now require that care and attention which is indispensable to make sheep husbandry profitable. Page 222. The way to doctor lambs to advantage is to give good food, and a plenty of it, to their mothers. Half a gill of Indian corn a day to each ewe before yeaning, and about two quarts per day of potatoes, turnips, or other roots, when they have lambs to nurse, will make your sheep and lambs healthy, as well as their owner wealthy. But if you half starve your sheep, you will quite kill your lambs. You will continue to cut, split, and pile wood in your wood-house, till you have enough to last at least two years. It is very bad economy to be obliged to leave your work in haying or harvesting to draw every now and then a little green wood to cook with, which is about as fit for that purpose as a brickbat for a pincushion, or a lump of ice for a warming-pan.

MARCH.

You may sow grass seed either as soon as the snow is off the ground, or, as some say, in August or September. You may see the question relative to the time for this purpose discussed, pages 25, 26. Be sure to use seed enough, say about twelve pounds of clover and one peck of herd's grass [timothy] to the acre. Page 26. If you did not sow grass seed in autumn with winter grain, you may now sow it, and even harrow it in. Though a few plants will be torn up, the grain will on the whole receive benefit from being harrowed in the spring. Before the spring work presses hard upon you, it will be well to employ your boys under your superintendence to train your steers or calves and colts to the yoke, saddle, or harness, for which you may see some excellent directions by Mr. James Walker, page 66. Top-dress winter grain. Top-dressings should not be used in the fall for winter grain, because they would be apt to make the young plants come forward too fast, and be the more liable to be winter-killed. Page 187. Attend to fences, page 214, and to drains. Page 296. By often changing the direction of your water-courses, you may render your mowing even, and prevent one part from becoming too rank and lodging before the other part is fit to cut.

APRIL.

Ploughing. Light sandy soils had better be ploughed in the spring, and not late in autumn, lest they become too porous and are washed away by the rains and floods of fall and winter. For general rules on this subject, see page 281, &c. It is best to sow spring wheat as soon as it can well be got into the ground. The soil and preparation should be the same as for winter wheat. Page 112. Sow barley as soon as the ground is sufficiently dry. Page 141. Sow oats. Page 138. Spring rye is cultivated in the same manner as winter rye. Page 130. Field peas as well as garden peas make an excellent crop. Page 155. Beans are also highly worth the judicious cultivator's particular attention. Page 160. Plant some potatoes of an early sort on early ground, to be used in July and August as food for your hogs, that you may commence fattening them early in the season. Page 271. Potatoes in small quantities at a time are good food for horses and oxen, as well as most other animals, especially in spring. They will go farther if steamed or boiled, but when given raw they are useful as well for physic as for food, being of a laxative and cooling quality. It is now about the time to sow flax, page 104, and hemp. Page 94. Every tool, utensil, &c. which will be wanted for the labors of the season, should now (if not done before) be critically inspected, thoroughly repaired, and such new ones of the best quality added as will probably be needed. We know of no place where every want of that kind can be better supplied than at the agricultural warehouse, No. 52, North Market street, Boston, owned by J. R. Newell; connected with which is the seed store of G. C. Barrett, where may be procured the best of seeds both for garden and field culture.

MAY.

Attend to your pastures. Do not turn cattle into pasture ground too early in the spring, but let the grass have a chance to start a little before it is bitten close to the soil. If your pastures are large, it will be good economy to divide them as stated page 300. Cleanse your cellars, as well as the rest of your premises, from all putrescent and other offensive and unwholesome substances. Plant Indian corn as soon as the leaves of the white oak are as big as the ears of a mouse. Page 28. Not only Indian corn, but peas, oats, buckwheat, and probably most other seeds, are benefited by wetting them in water just before sowing, and rolling them in plaster. Plant potatoes for your principal crop. Page 271. Sow millet. Page 145. Sow lucerne on land thoroughly prepared, and keep it free from weeds. Page 19. Declare war against insects. Page 317. The artillery for the engagement may be elder juice, or decoction of elder, especially of the dwarf kind, decoction of tobacco, quicklime, lime-water, soot, unleached ashes, strong lye, tar or turpentine water, soap-suds, &c. Dissolve about two pounds of potash in seven quarts of water, and apply the solution to your fruit-trees with a painter's brush, taking care not to touch the leaves or buds. A lot of land well stocked with clover is wanted by every good cultivator for pasturing swine. Page 167.

JUNE.

Summer made Manure demands attention. Most farmers yard their cows at night through the summer; their manure should be collected into a heap, in some convenient part of the barn-yard, to prevent its being wasted by the sun and rains. A few minutes' attention in the morning, when the cows are turned out to pasture, would collect a heap of several loads in a season, ready for your grass grounds in autumn. Dress your Indian corn and potatoes, thoroughly extirpating weeds, and please to place a handful of ashes or plaster, or a mixture of both, on your hills of corn and potatoes. These substances are commonly applied before the first or second hoeing. But ashes or quicklime (which is also an excellent application for corn) will have a better effect in preventing worms if laid on before the corn is up. Be careful to save all your soap-suds after each washing, as they answer an excellent purpose when applied to fruit-trees, both as manure and as an antidote to insects. 'Plaster or live ashes sown upon your pasture grounds, will not only repay a handsome profit by increasing the value of your feed by bringing in the finer grasses, such as white clover, &c., but will greatly improve your lands for a potato fallow, and a succeeding wheat crop, whenever you may wish to take advantage of a routine of crops.'

JULY.

Hay-making. Page 288. Make as much of your hay as possible in the early part of the season, as there is at that time a greater probability of your being favored with fair weather. More rain falls on an average in the latter part of summer, or after the 15th of July, than before. If the weather is so unfavorable that hay cannot be thoroughly cured, the application of from four to eight quarts of salt to the ton is recommended. In this way it can be saved in a much greener state, and the benefit derived from the salt is many times its value. Another good method of saving green or wet hay, is that of mixing layers of dry straw in the mow or stack. Thus the strength of the grass is absorbed by the straw, and the cattle will eagerly devour the mixture.

Harvesting. Page 293. The time in which your grain crop should be cut, is when the straw begins to shrink, and becomes white about half an inch below the ear; but if a blight or rust has struck wheat or rye, it is best to cut it immediately, even if the grain be in the milky state. Barley, however, should stand till perfectly ripe.

AUGUST.

Please to attend in season to preserving your sheep from the *œstrus ovis*, or fly which causes worms in their heads. Page 239. This may be done by keeping the noses of the animals constantly smirched with tar from the middle of August till the latter part of September. In order to accomplish this, it has been recommended to mix a little fine salt with tar, and place it under cover, where the sheep can have access to it, and they will keep their noses sufficiently smirched with tar to prevent the insect from attacking them. Destroy thistles, which some say may be done by letting them grow till in full bloom, and then cutting them with a scythe about an inch above the surface of the ground. The stem being hollow, the rains and dews descend into the heart of the plant, and it soon dies. Select the ripest and most plump seeds from such plants as are most forward and thrifty, and you will improve your breeds of vegetables by means similar to those which have been successful in improving the breeds of neat cattle, sheep, &c. As soon as your harvesting is finished, you will take advantage of this hot and dry weather to search your premises for mines of manure, such as peat, page 209, marl, page 205, mud, &c., which often gives unsuspected value to swamps. Now is also a good season to work at draining. Page 296. You may drain certain marshes on your premises, which will afford you better soil than you now cultivate, cause your land to be more healthy, and the earth taken from the ditches will make valuable deposits in your cow-yard and pig-sty.

SEPTEMBER.

A correctly calculating cultivator will make even his hogs labor for a livelihood. This may be done by throwing into their pens potato-tops, weeds, brakes, turf, loam, &c., which these capital workmen will manufacture into manure of the first quality. Page 190. You cannot sow winter rye too early in September. If it be sowed early its roots will obtain such hold of the soil before winter, that they will not be liable to be thrown out, and killed by frost. Page 130. It may be sowed early to great advantage in order to yield green food for cattle and sheep, particularly the latter, in the spring. Winter wheat, likewise, cannot be sowed too early in September. Page 112. Attend to the barn-yard, and see that it has a proper shape for a manure manufactory, as well as other accommodations, adapted to its various uses. Page 77. You may as well have a hole in your pocket, for the express purpose of losing your money, as a drain to lead away the wash of your farm-yard. True, it may spread over your grass ground, and be a source of some fertility to your premises, but the chance is that most of it will be lost in a highway, or neighboring stream.

OCTOBER.

Ploughing. Page 281. Stiff, hard, cloggy land intended to be tilled should be ploughed in autumn. Fall ploughing saves time and labor in the spring, when cattle are weak, and the hurry of the work peculiar to that season presses on the cultivator. A light sandy soil, however, should not be disturbed by fall ploughing, but lie to settle and consolidate through the winter. Select your corn intended for planting next season from the field, culling fine, fair, sound ears from such stocks as produce two or more ears, taking the best of the bunch. Page 32. You will consider well which is the best method of harvesting corn, and adopt one of the methods mentioned by judge Buel. Page 31. If the husks and bottoms of your corn, when stowed away for winter, are sprinkled with a strong solution of salt in water, (taking care not to use such a quantity of the solution as to cause mould,) and when dealt out are cut fine with a straw cutter, they will make first-rate fodder. Do not feed hogs with hard corn without steeping, grinding or boiling it. The grain will go much the farther for undergoing some or all of these operations, and if a due degree of fermentation is superadded, so much the better.

NOVEMBER.

In many situations it will be excellent management to rake up all the leaves of trees, and the mould which has been produced by their decay, which can be procured at a reasonable expense, and cart and spread them in the barn-yard as a layer, to absorb the liquid manure from your cattle. Likewise it would be well to place quantities of them under cover, in situations where you can easily obtain them in winter to use as litter to your stables, &c. They do not rot easily, but they serve the purpose of little sponges to imbibe and retain liquid manure, and by their use you may supply your crops with much food for plants which would otherwise be lost. Attend with diligence and punctuality to the wants of the four-footed tenants of your barn, hog-sty, &c. Do not undertake to winter more stock than you have abundant means of providing for. When young animals are pinched for food at an early period of their growth, they never thrive so well afterwards, nor make so good stock. See that you have good stalls, stables, &c., page 248; cow-houses, page 45; a proper implement for cutting hay and straw, page 51; an apparatus for cooking food for cattle and swine, page 53. You may also carry out and spread compost, soot, ashes, &c., on such of your mowing grounds as stand in great need of manure. Though some say that the best time for top-dressing grass land is immediately after haying, any time will do when the ground is free from snow, and the grass not so high as to be injured by cattle's treading on it.

DECEMBER.

Woodland. We think that cultivators may derive advantage from attending to the observations by the Hon. John Welles, relative to wood-lots, the manner of cutting them over, &c. Page 316. We advise every farmer, and his help, &c. so to treat domestic animals that they may be tame and familiar. It is said of Bakewell, a famous English breeder of cattle, that by proper management he caused his stock to be very gentle. His bulls would stand still to be handled, and were driven from field to field with a small switch. His cattle were always fat, which he said was owing to the breed as well as keep. Colts should also always be kept tame and familiar, and you may then train them to saddle or harness without danger or difficulty. Page 66. The farmer should obtain his year's stock of fuel as early in the season as possible, and before the depth of snow in the wood-lands renders it difficult to traverse them by a team. You may, when the ground is frozen, cut and draw wood from swamps, which are inaccessible for cattle in warm weather. If you cut wood with a wish that the stumps should sprout, let it be after the fall of the leaf, and before the buds swell in the spring. [See Gen. Newhall's statement, New England Farmer vol. x. p. 230.] The Rev. Mr. Elliot wisely recommended, when bushy ground, full of strong roots, is to be ditched, beginning the ditch in the winter, when the ground is frozen two or three inches deep. The surface may be chopped into pieces by a broad axe, with a long helve, and the ditch completed in warm weather. The farmer may, probably, hit on a good time for this work in December, when there happens to be no snow, and when it will not interfere with other farming business. When the season has become so severe that little can be done abroad, much may be done relative to farming operations, and other good works, by the fireside, in contriving the proper course of crops for each field, settling accounts, reading useful and entertaining books, and laying the foundation, by mental culture, for the usefulness and respectability of those who compose the *farmer's family*.

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