



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### **Usage guidelines**

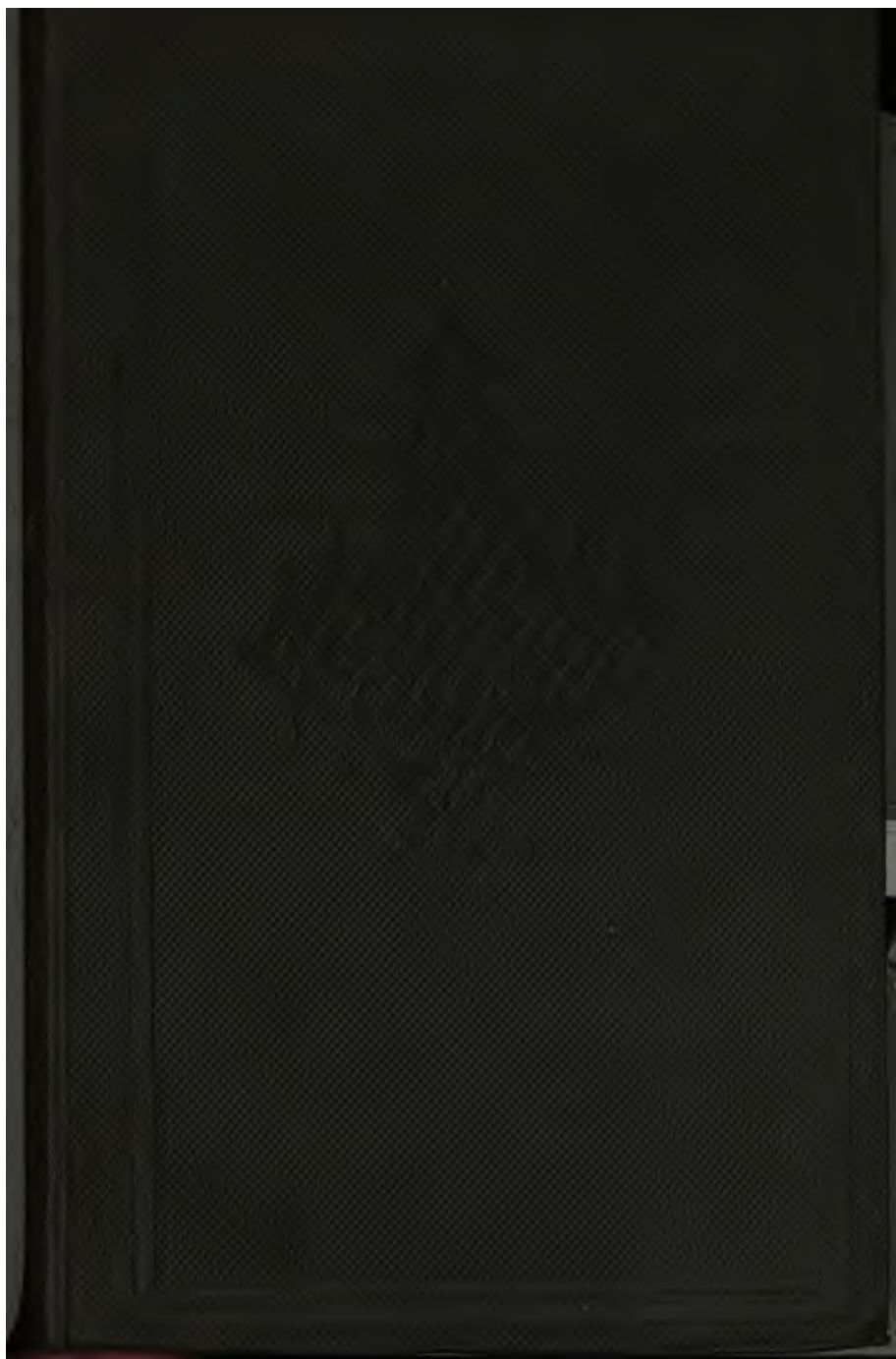
Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

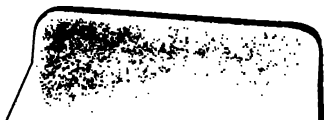
### **About Google Book Search**

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



46.

1493.







THE  
SCIENCE AND PRACTICE  
OF  
AGRICULTURE.



BY

THOMAS SKILLING,

AGRICULTURIST TO THE BOARD OF EDUCATION, AND SUPERINTENDENT OF  
THE NATIONAL MODEL FARM, GLASNEVIN; AUTHOR OF THE  
"FARMER'S READY RECKONER."

DUBLIN:  
JAMES M'GLASHAN, 21, D'OLIER-STREET.  
W. S. ORR AND CO., LONDON.

MDCCCXLVI.

1493.

Printed by **ALEXANDER THOM**, 87, Abbey-street, Dublin.

## P R E F A C E.

---

THE reader will perceive that the following work has no pretensions to be a complete Treatise on Agriculture, but merely a series of remarks on the past and present state of cultivation generally, in different parts of the world, particularly of Ireland ; with hints and suggestions as to the probable means of improvement. The various subjects are an outline of the *practical* part of a course of lectures delivered at the Glasnevin Institution of the Board of Education, to the Teachers and Agricultural Pupils in training there.

The first intention of the Author was, to arrange a small text-book, solely for the use of the Teachers of Agricultural and other schools ; but on further consideration it was thought better to confine the matter chiefly to practical subjects in the first instance, and to treat some of the more important matters in detail, for the instruction and benefit of the farming classes generally, without rendering it less useful to the schoolmasters who may avail themselves of it. The scientific part of the course has been reserved for a future occasion, should time and opportunity permit.

The subject of agricultural improvement in this country must always, to some extent, involve questions of civil policy—the relation of landlord and tenant,



upon which, among the wisest and best of men, much difference of opinion prevails. The Author has on all occasions endeavoured to avoid such controversies, but at the same time has not hesitated to express a candid opinion. This, in a great measure, has induced him to publish the present work on his own responsibility, without reference to the distinguished public body with which he is connected; the opinions and sentiments, therefore, expressed, are those of an individual, and not of the Board of Education.

In the first chapters of the work, the agriculture of the ancients, and the present state of agriculture in various parts of the world, the author is indebted to several authors and travellers; the principal of which are, *Dixon, Loudon, Chateveaux, Jacob, &c. &c.* The latter portions are founded entirely upon personal observation and experience.

The critic will readily discover that the book has been got up at different times, and in a very hurried manner; the only apology the author has to offer is, the object was disinterested, an intention of rendering some public service. It was compiled chiefly in single hours snatched from almost incessant duties; and should it ever reach a second edition, many corrections, alterations, and additions may be advantageously made.

GLASNEVIN, 12th August, 1846.

## CONTENTS.

---

CHAPTER.	PAGE.
I.—Origin and Importance of Agriculture, . . . . .	1
II.—History of the Agriculture of the Ancients, . . . . .	8
III.—Modern Agriculture, . . . . .	19
IV.—Agriculture of Holland and Belgium, . . . . .	35
V.—Agriculture of Great Britain, . . . . .	40
VI.—Agriculture of Ireland, . . . . .	45
VII.—First Error in Irish Farm Management— Suffering numerous, useless, and crooked Gripes and Ditches, to encumber and occupy the Land, . . . . .	56
VIII.—Second Error—The not sufficiently Draining and Drying the Land, . . . . .	65
IX.—Third Error—Not Trenching and deepening the Land, . . . . .	92
X.—Fourth Error—Exhausting the Land by a suc- cession of Grain or other Crops, . . . . .	103
XI.—Fifth Error—Not following out a regular rotation of Crops, . . . . .	106
XII.—Sixth Error—Not cultivating Green Crops, . . . . .	117
XIII.—Seventh Error—Not keeping a sufficient num- ber of Cattle, . . . . .	119
XIV.—Eighth Error—The keeping too many Horses, particularly on small Farms, . . . . .	145
XV.—Ninth Error—The not collecting and applying a sufficiency of Manure, . . . . .	151
XVI.—Tenth Error—Suffering the Land to be over- run with Weeds, . . . . .	162
XVII.—Eleventh Error—Our ignorance, indolence, and other bad habits, . . . . .	165

CHAPTER.	PAGE.
XXVIII.—Farms in general—Choosing, Laying off, and general Cultivation, . . . . .	171
XIX.—Laying off and Subdividing a Farm, . . . . .	183
XX.—General Cultivation, . . . . .	187
XXI.—After Culture of the Green Fallow Crops, . . . . .	204
XXII.—Leguminous Plants, . . . . .	208
XXIII.—The Grass Crops, . . . . .	215
XXIV.—The Grain Crops, . . . . .	225
XXV.—Cultivation of Flax, . . . . .	236
XXVI.—Dairy Management, . . . . .	254
XXVII.—Pleura Pneumonia, . . . . .	272

---

THE

## SCIENCE AND PRACTICE OF AGRICULTURE.

---

### CHAPTER I.

#### THE ORIGIN AND IMPORTANCE OF AGRICULTURE.

AGRICULTURE was the first art or trade practised by man. Of this we are informed by holy writ and profane history; and it is obvious, that the best mode of raising and procuring their subsistence, must have been the first care and occupation of the human race. For the same reason it is the most important, and will engage the greater number of the people in every prosperous and happy country. It is the most healthy occupation in which mankind can be employed,—constant exercise in the open air, among the products of nature, turning up and cultivating the soil, free from the gaseous effluvia and pestilential vapours generated and rising from crowded cities and manufacturing towns. Hence, the inhabitants of rural districts, possessed of the necessaries of life, and the means of procuring them sufficiently, are more healthy, happy, contented, virtuous, peaceable, and attached to their country, than any other class of the community.

It is the most honourable trade; for in all ages and countries agricultural pursuits have been followed by every class and grade of society, from the chief magistrate to the lowly peasant. Emperors, kings, princes, and nobles, have patronized and practised it. In our own times and country, our beloved Queen, with the

Prince-Consort, are setting a right royal example to every farmer and good housewife in Her Majesty's dominions.

It is the most profitable of all trades, when conducted with skill and success. Nature supplies the raw material, and by her great agents, heat, light, air, and water, keeps the whole machinery in continued action, ministering to, and supplying the wants and necessities of the animal and vegetable creation. Man has only to aid and assist the great machine, in carrying forward and directing the operations to a successful issue.

Perhaps the greatest anomaly in human affairs is, though agriculture is the oldest trade, the one longest practised, and by far the greater number of the human race engaged in it, the most important and useful of all others, the most healthful and pleasing, the most honourable, and, when judiciously practised, the most profitable, yet, of all other arts followed by mankind, there are fewer good tradesmen among agriculturists, according to the relative number employed, than of any other occupation whatever.

It may be very important to ascertain and explain the cause of this anomalous state of the agricultural community. There are, undoubtedly, many causes, among which the following are prominent:—It has unfortunately occurred, that in no part of the world has agriculture been considered a regular trade, to which a man or boy ought to be bound, and serve a competent master or instructor, during a regular and specified time, in the same manner as apprenticeships are regulated in other arts. The most simple and easily acquired trade is protected by its term of servitude; and the apprentice must be a competent workman before he commences as a freeman on his own account. The tailor, hatter, shoemaker, even the chimney-sweep, and other callings, equally simple and easily acquired, have their terms of servitude, from five to seven years, established; but the farmer or agriculturist, whose trade is the most complicated and difficult, requiring the highest degree of practical and scientific knowledge, commences at pleasure, when he finds it convenient,

without any such restriction or qualification. The tailor, shoemaker, &c., in this country, will receive from 12s. to 20s. per week for his work, whereas a labourer will receive from 6s. to 8s.; the one has served an apprenticeship to his business, is an expert and competent workman—the other has served no time, is awkward and incompetent, and is dear even at the low wages. Would it not be possible to raise the wages of the labourer or agriculturist to somewhat the same standard as other tradesmen, and render them valuable to the employer at the enhanced wages? We think it is quite possible, and by the same means that the other tradesmen have acquired their celebrity and value. Let the agriculturist serve a regular time to a competent instructor, and he will become equally if not more valuable. It will require a young man five or seven years to become a decent ploughman, and it is not perhaps one in twenty will be a *crack* hand, even in that time; it will require him several years to understand perfectly the feeding, grooming, harnessing, and working in different yokes, and general management of horses; likewise the feeding and management of cattle. He will be employed several seasons before he can handle expertly, and at different jobs, the spade, shovel, grope fork, pick, and other implements in garden and farm; he must handle the scythe several seasons before he can be rated a fair mower; the same may be said of sowing the different seeds, grains, grasses, &c.; the preparation of the ground for, and sowing of green crops, their after culture and management; the cutting and harvesting of grain and other crops, with a variety of indispensable operations not here mentioned; with a certain degree of scientific knowledge, rotations of crops, the nature of soils and manures, their improvement and application; and every agriculturist who farms his own land, or that of others, ought to be competent on these points, and were he so he could make good wages, and be worthy of it; a man so qualified, even at present, would obtain as much wages as an ordinary tradesman in other lines, and in most parts of the world. Agriculture, therefore, will never flourish and be remunera-

tive to those engaged in it, unless they consider it a trade, and learn it as such. The working or small farmer considers himself quite competent, if he can, even in the most awkward manner, perform some of the common practical operations, such as ploughing, digging, reaping, mowing, &c. &c.; and the extensive or gentleman farmer, without even these simple qualifications, and in general as ignorant of science and superior practical knowledge and experience as his more humble neighbour, the possession of money, or what is termed capital, being considered quite sufficient to qualify him for the management of the most extensive farm; and in general the great landed proprietors and their agents, for obvious reasons, prefer the latter class of occupiers; do we wonder, then, that the greater portion of the lands of every known country is lying in an unprofitable, partially sterile condition, yielding not the one-half or one-fourth of what it might or ought to do, under a judicious course of cultivation? The common, uneducated, hard-working farmer, and the ignorant capitalist, are altogether incompetent to the important task of profitably extracting from the soil its maximum produce, and fairly testing its capabilities; of conducting the complicated and varied machinery of a well-regulated and successful farm establishment, which requires talents, perseverance, skill, experience, and information of a very extensive description. The educated, prudent, and really competent farmer, ought to understand and be able to avail himself of all the various circumstances connected with his profession, and which may fall in his way. The changes of climate, season, and soil—the judicious improvement of the latter; the nature and properties of manures—the best modes of management and application; the nature and properties of the various grain and green crops, plants and vegetables, that sustain the animal creation, with the proper courses of cropping, according to soil and circumstances; the peculiar nature and properties of the various domestic animals—cattle, horses, sheep, pigs, &c.; the best modes of feeding and management, with a knowledge of the diseases incident to each, and the proper

mode of treatment; the uses and judicious application of the various implements and machines, that have, from time to time, been invented and introduced for the purpose of expediting and rendering the several operations more simple and perfect. All these subjects, and a great deal more, should the farmer perfectly understand; yet how many, in the best cultivated districts, and of our most eminent occupiers, are qualified on all these heads, or even any number of them? No wonder, then, that lands are mismanaged; they must be so until a regular course of education and training shall elevate the mental and physical powers of this most important class in every country.

It has long been remarked, and with justice, that of all tradesmen or artizans in the world, none are so stupidly bigoted, or prejudiced, in favour of old established customs, as farmers; though many of their practices are obviously absurd, or even pernicious, they hold with superstitious regard, and with the greatest tenacity, to any habit which they consider fully established by time and custom. Every other tradesman will willingly imitate or adopt a new mode of management, and improve upon his former habit or custom. The tailor, the bootmaker, the hatter, &c., will eagerly adopt and imitate a new cut or shape, no matter from whence derived—London or Paris—if it be an improvement on his former work, or more fashionable. Not so the farmer; he sneers at new customs, scorns advice, if it interfere with his prejudices and preconceived opinions; and BOOK FARMING he utterly ridicules and despises. The crooked, wide, and open fence he maintains in all its deformity with a kind of reverence, though from dilapidation it has long since ceased to be of any use for the purposes it was erected. The same crooked ridge, and in the same direction, that his great grandfather drew out for him, is maintained with the same veneration; and any deviation from these relics, or ancient customs, would be looked upon as the precursor of bad luck, or misfortune, to the household and concerns. He says, "Since my father, grandfather, and great grandfather lived here in the same house, and reared us all



on the same land, and we got through the world well enough, why should I leave the good old customs of old times?" Now, why should the inhabitants, the people of the same country, having, to a certain extent, the same habits, the same feelings, the same objects, differ so far in their opinions regarding the modes of accomplishing their ends, as these tradesmen? Or, how is it, that the mechanics, artizans, and commercial men of the United Kingdom are superior to their fellows in every other country in the world; competing, and successfully, in every foreign market, under the greatest disadvantages—hostile tariffs, jealousy, rivalry, and ignorance; while the farmers have been, comparatively speaking, at a *stand still*—the land neglected and poor; clamouring for protection to agriculture, or a premium for ignorance and bad management. The why is quite evident; the mechanics have been keeping pace with the spirit and improvement of the age; they have availed themselves of education and science, the great powers of mental expansion, which have raised them to their present unrivalled position. The farmer has neglected or despised education and science, so far as his calling is concerned, and hence his backward position, and its evil effects upon the commonwealth. It may be a question, how far the cultivators of the soil are to blame for this state of things; or whether those whose position in society enabled them, and whose interest called upon them, to remedy this neglect, and extend a competent education to those who are the foundation of their wealth and greatness, and the best support of our national independence.

The foregoing observations lead us to another subject, another prominent reason why the true knowledge and practice of agriculture is so backward among the great masses of the community, who subsist by that art in these countries.

Until within a very few years, no attempt was made to give the rising generation, the young agriculturist, any mental instruction in the school, to assist him in after-life in the proper knowledge and practice of his business. Almost every other trade requires a certain

preparation or course of scientific instruction. The clergyman, the lawyer, doctor, the merchant, engineer, and mechanic, all and each require an early and peculiar course of school education, to enable them to properly understand and acquire the science and practice of their future occupation. Not so the farmer, if he merely acquires the rudiments of the most common and simple education, reading, writing, and arithmetic, he is considered well qualified to enter on his profession. The idea of the necessity of scientific knowledge, the application of science to practice, never occurred to the persons most deeply interested; in fact, such attainments have been scouted and ridiculed as unnecessary, and worse than useless; though it is now an acknowledged fact, that the really competent, scientific, and practical farmer would require a higher degree, and wider range of science, than any of the forementioned professions. The question of the practicability and success of introducing a system of agricultural instruction into our schools has been decided, and completely set at rest by the National Board of Education in their agricultural schools; and the teachers in training will have ample opportunity of appreciating the importance of this course of instruction to the rising generation, and the great facility with which it can be communicated and received, even by children; the country will yet appreciate the importance of such an education to the rising generation—of having every boy, who has received his education in an agricultural school, acquainted with the science and best practice of farming.

The principal sciences which have been called in aid and found useful to the practice of agriculture, are—Chemistry, Geology, Botany, Vegetable Physiology, Animal Physiology, and Mechanics; of these Chemistry is by far the most important, and ought to be well understood by the young agriculturist.

## CHAPTER II.

## HISTORY OF THE AGRICULTURE OF THE ANCIENTS.

As we have stated that this must have been the first trade, it may be instructive, by a brief sketch, to trace its rise and progress through the different ages and countries of the world, so far as history and tradition have furnished us with the means of doing so. The savage depending on the precarious subsistence derivable from the chase, would naturally fall on the expedient of a more certain and regular supply of food by domesticating the inferior animals; hence pasturage must have been a primitive practice. But as man and animals multiplied, pasturage would prove inadequate to their wants, particularly when the animal of reason found it his interest or inclination to herd with his fellow man, for mutual protection—to form communities, to dwell in towns and villages. The cultivation of the soil in these localities must of necessity commence, in order to furnish the inhabitants and their cattle with food; the cultivation of grain, of fruit, and vegetables must succeed; times of sowing would be observed from experience. But the best soil would deteriorate and become foul and exhausted by constant cropping; necessity would furnish remedies—manures, irrigation, and fallowing would be adopted and taught by experience; every succeeding generation would become more expert and acquire more knowledge. Hence the earliest records of eastern nations show the skill and industry manifested by the people in their modes of management, and what is still more singular, almost the same practices prevail in the same countries at the present day.

## AGRICULTURE OF THE EGYPTIANS.

It is confessed by most writers that agriculture was practised in Egypt earlier than in other nations; there is no doubt that corn was successfully cultivated there,

even to export and supply other countries. Its riches, early civilization, and refinement were the consequences of its successful agriculture. The soil of Egypt is alluvial, and from the facility of irrigation, which is practised to the fullest extent, and almost supersedes the use of manures, it is kept in a high state of fertility. It has been in all ages a productive country. The products were chiefly corn of various kinds, pulse and other vegetables; the animals were horses, sheep, asses, and camels. Their practices and modes of husbandry, though simple, were much suited to the soil and other circumstances of the country. In a country where no rain falls, and where cultivation is carried on extensively, irrigation must always be an essential and important operation; this in ancient Egypt was carried to great perfection. The ruins of their canals, aqueducts, and reservoirs, strike the traveller with wonder. The canals they carried by gradations to the high grounds, the water being raised by means of wheels turned by oxen, and a very ingenious contrivance—a man walking on a board with raised edges; they also procured water from the Nile, by two men swinging a kind of basket between them. They had recourse to these contrivances for the purpose of securing a sufficiency of water to irrigate their grounds and gardens. They performed the usual operations of ploughing, harrowing, sowing, reaping, &c. &c. Their implements were few and simple, the earliest, or one first in use, resembled a hoe or mattock, succeeded by the plough, harrow, all of a rude kind; the reaping-hook, baskets, stalls for their cattle, and, of course, many other necessary implements of which we have no record.

THE JEWS AND OTHER EASTERN NATIONS.

The Jews and other eastern nations, lying adjacent to, and holding frequent intercourse with the Egyptians, would necessarily have a great number of practices and customs in common, varied only by the difference of soil, climate, and other circumstances.

The Bible affords us a pretty clear outline of the

agriculture of the Jews, and establishes their reputation as skilful husbandmen. Before they settled in Egypt they mainly depended on their flocks and herds, which they pastured; but during their sojourn there, husbandry and cattle management were their chief employments; and on their occupation of the promised land they would retain and adopt a great deal of what they had learned and practised in Egypt. Though travellers in the present day represent the land of Canaan as infertile and almost barren, yet it was altogether different at and after its conquest by the Jews. It is represented by them as "a land flowing with milk and honey," and they succeeded in raising a sufficiency of food for a large population; though, from their improvidence and negligence in not storing up in times of plenty, famines and scarcity were not unfrequent. The dissimilarity of soil, climate, and circumstances of Canaan and Egypt, would render it necessary for the Jews to vary their course of management, and from the original inhabitants they would procure much necessary and useful information. In Canaan they found products unknown in Egypt, and as experience would teach them the impossibility of cropping without intermission, and without manure, and as they had not the annual overflow of the Nile and other extensive means of irrigating and enriching the soil, they had recourse to *fallowing*, and laws to enforce it. The droppings of their cattle had to supply the deficiency of fuel, and fallow the deficiency of manure. The landlords of England enforce and perpetuate the fallow system, by clauses in their leases, in order to prevent the exhaustion of the soil, arising from the same cause, want of manure and continued grain cropping; the only difference between our farmers and those of Palestine being, the latter used theirs for fuel, burnt it in the fire, whilst the former allow the sun and air to dissipate it by slow combustion in the fields.

All classes cultivated their respective holdings. King David was an extensive farmer; he had stewards or bailiffs to overlook and superintend the several departments—over the tillage of his farm, his storehouses, his

wineyards, his olive trees, his herds, his flocks, his camels, and his asses. They ploughed their land somewhat as we do, with two beasts of the same species, yoked abreast, the yoke or collar being fastened to the neck.

Their implements were few and simple, yet sufficient for all their purposes. Their plough must have been somewhat like ours, with a share and coulter, for they speak of sharpening them; and they recommended and practised early ploughing. They sowed the grain broadcast, and from a basket, the harrow not being in use; they covered the seed with the plough. They extirpated the weeds and loosened the soil with a hoe and mattock; and reaped with a sickle, binding in sheaves. It does not appear that they built their grain in stacks, but at once conveyed it to the barn or threshing floor, which were generally in the open air, so situated that the wind could blow away the chaff. In threshing their grain they had a most clumsy and awkward method, which is practised in some parts of civilized Europe, even at present; they spread it out, trod it with oxen and horses, or carts of a peculiar construction were used for the same purpose—some of the more delicate seeds were beaten with rods or staves. Winnowers were then unknown, they used a sieve; and to separate the chaff from the grain, threw it against the wind. They cut straw for their horses and asses, and mixed it with barley. They stalled and fatted calves and bullocks by tying them up. They churned their milk and made butter, also cheese.

Their produce consisted of wheat, barley, and rye; the leguminous crops, beans and lentiles; the fruits of the olive and the vine, with the melon and gourd tribes, and figs; the produce of their cattle, flesh, milk, butter, and cheese, with honey.

Their animals were the horse, ass, camel, cattle, and sheep.

Human nature is the same in all ages and countries under similar circumstances. A custom, or rather abuse, had crept in among the Jews at a very early period of their settlement in the Holy Land, continued to

increase, producing the worst consequences, has been felt in almost every country and age of the world since, is producing serious grievances in our own time and country; we mean *the land monopoly*. In the time of Isaiah the prophet, this is prominently noticed. It appears that certain of the Jews had managed to monopolize and accumulate to themselves a great portion of the land, to the exclusion of their neighbours and the great bulk of the people, whom they enslaved, rendered miserable and discontented, producing turbulence and danger to the state. It would be well if the monopolizers of the present day would look well to the words of the prophet of old, "*Woe unto them that join house to house, and lay field to field, till there be no place, that they may be placed alone in the midst of the earth.*" (Isaiah v. 8.)

#### AGRICULTURE OF THE GREEKS.

The agriculture of the Greeks would necessarily be similar to that of the Egyptians, from whom, it is said, they sprung; and to whom they owed their civilization, varied by the difference of soil, climate, and requirements of the country, and bearing in mind the progressive improvement which was going on in the world. This will be particularly observed in referring to the precepts and writings of their early authors. They are the first who wrote works on that subject, and which have been handed down to us. Some of their principles and modes of management cannot be excelled at the present day, as the following brief notice will show.

They followed summer fallowing, but recommended frequent and deep ploughing during the spring and summer, for the purpose of *stirring the soil, allowing the air to pass in, and exposing the different parts to sun, air, and light.*

The mode of ploughing was paid great attention to; straight furrows were strongly recommended. They were the first who attended successfully to the collection and management of manure, with the properties of which they were well acquainted. They mixed dung

with stubble; knew the value of various kinds of composts; and *earth that had lain under water* was prized by them as excellent manure. They knew the importance of inorganic manures, the ash of stubble being a favourite.

The system of ploughing in green crops for manure, was well known and practised, and they were fully alive to the importance of eradicating weeds, as affording more air and light to the plants.

We first hear of draining in Greece; and, from the tenacity of a large portion of the soil, this, which in Egypt and Palestine would have been superfluous, was in Greece a necessary practice. They carried off the surplus moisture by sewers and open drains. The Greeks also recommended a mixture of the earths—clay with sand and calcareous earth. These are most important principles, and are recognised by all good cultivators of the present day. Their soil was various, deep, and rich in the valleys; clayey in some parts; but in general sandy, with a calcareous subsoil. The surface of Greece is irregular, rocky, and mountainous.

The products were grain and leguminous plants, such as are in present cultivation; with the vine, fig, olive, date, apple, and other fruit; flax and perhaps hemp.

Their live stock were horses, asses, mules, cattle, sheep, goats, and swine.

It may be worthy of remark, that the laws of Solon forbade the purchase or occupation of land beyond a certain extent; these restrictions were, however, afterwards disregarded or broken through, for we are told of rich and extensive proprietors who, having ceased cultivating their properties, had employed stewards for that purpose; but in Greece, *in her most prosperous days*, every citizen had a piece of land, which he cultivated for himself and family, and upon which was raised their food and raiment.

#### AGRICULTURE OF THE ROMANS.

The Romans derived their arts, sciences, and civilization from the Greeks in the first instance, and afterwards from the various nations which they overran and



conquered. They not alone received knowledge from every part of the known world, but carried and diffused that knowledge wherever their conquests extended; they were the conquerors—they were also the benefactors of mankind.

The two great arts which absorbed their chief attention and skill were agriculture and war; and these they carried to a degree of eminence superior to all other nations. In their early days, their agricultural knowledge and practices must have been confined in a great measure to what they learned from their nearest neighbours, and would be similar to that which we have described as practised by the Greeks and eastern nations, but when in the zenith of their power and prosperity, during the latter days of the republic, the early empire, and even towards its decline and fall, everything connected with the practice of agriculture had reached to a point of excellence; and even the science was well understood, immensely beyond what is either known or practised in the greater part of Europe at the present. A well selected epitome from the writings of the Roman authors would be a most desirable text-book in any country at the present time.

In a great and extensive empire, where such a diversity of climate, soil, and circumstances existed, the products and modes of management must have been various indeed; even in Italy this must have caused variety in the method of cultivation, and products. We have not materials from history by which we could minutely describe the various practices in the different localities, nor is it desirable or necessary to do so; a brief description of the general agricultural management, as handed down by their historians, will be quite sufficient for our purpose.

The early Romans, like the Greeks, were all landed proprietors, each citizen holding a certain portion, which he and his family cultivated. To this their historians ascribe their great eminence in agriculture, and attribute its decay to the accumulation of lands in the hands of wealthy and extensive proprietors, who let it out on rental or farmed it by slaves and servants. These sub-

jects are matters of very serious import to the landed interest in every country, particularly at the present time.

The agrarian laws of Romulus allowed only one and one-fifth acre to every citizen, but after the expulsion of the kings it rose to three and two-fifth acres, and Stolo's law increased it to 300, the most that a citizen could hold; but eventually such laws were infringed or disregarded, and the wealthy accumulated large estates, which they let or hired out in different ways to farmers at a rent, but more frequently they supplied the stock and capital, and gave the occupier a portion of the produce for his labour, which varied with the situation and quality of the land from one-fifth to one-ninth the produce. Many of the wealthy superintended the management of their own estates, and employed stewards or bailiffs, with hired servants and slaves; and their exemplary mode of treating these people is well worthy of imitation. They were allowed a sufficient quantity of nutritious and wholesome food at all times and seasons, this varying with the severity of their labour; they had a regular and stipulated quantity and quality of clothing, suitable for all kinds of work and weather.

Their modes of culture and management were in general very correct, and worthy of imitation. The animals used in labour were the ox, ass, and mule, the horse being exclusively devoted to the saddle. The ox was used for the plough, the ass and mule for carrying burdens on the road or field; on some light soils the latter were used in the plough, and yoked in pairs. In ploughing they recommended the furrows to be *straight, deep*, to leave no *balks* (hard unmoved soil), and all furrows to be alike breadth. Trenching must have been a practice, for Cato says, that corn land should be of good quality and *two feet in depth*. The season for ploughing was when *land was not wet*. Fallowing was a universal practice, and the rotation was one grain crop after fallow, but in very rich land, or where manure could be obtained, two or more crops were taken in succession. In this we at the present time excel the Romans, by alternating the grain with the green fallow

crops, artificial grasses, house-feeding cattle, and raising manure by those new crops; preventing the loss sustained by the land lying idle in bare fallow. But notwithstanding the obvious absurdity of, and loss sustained by this primitive practice, we find a great portion of cultivated England, and even Scotland, at this time following this custom of the Greeks and Romans. The Roman custom of managing the fallow was excellent, and very superior to what is followed in many instances at the present. They commenced ploughing in autumn, immediately on the removal of the crop; again in spring and summer, repeatedly harrowing and cleaning the ground, exposing the surface to sun and air, and completely eradicating weeds.

They had very correct views of manures and manuring. They suffered nothing of the kind to go to waste, but collected it from every source—vegetable, animal, and mineral. Pigeon dung was considered the best, and next *human excrement, and urine*; the latter they mixed in composts and applied to their most valuable crops—the vine and the olive. Dung-hills were made near the villa or steading, and special care was taken to retain the liquid, and by covering the top and sides of the manure heap with twigs and leaves they prevented the sun from drying it up—an important practice that we too much neglect. They also took care to draw out no more manure than they could cover on the same day; and they top-dressed their sickly crops with stimulating manure, and wisely recommended the frequent application, and a small rather than a large dose at a time.

They knew the value and importance of inorganic manure; and, like the Greeks, they burnt the stubble and used the ashes, also twigs and brushwood, the ashes of such being considered the most permanent of all in its effects. They were well acquainted with lime and its effects, especially on the vine and the olive. They knew the use of marl, but from its scarcity in Italy its use was limited.

They sowed their grain somewhat as we do at present by hand, and covered with the plough. In reaping they recommended and practised the cutting of the

grain before it was too ripe; their maxim, "*To reap two days too soon rather than two days too late,*" should be hung up in every farm house.

Their mode of threshing by treading with cattle, or drawing a heavy machine over it, as also their winnowing, was exceedingly clumsy and untidy.

They were particularly careful to weed and stir the earth frequently between their growing crops; and where corn was too luxuriant when young, they pastured it with cattle and afterwards harrowed. Irrigation and watering were practised, and in these operations they excelled. Draining was also followed, both for carrying off surface and under or spring water.

Their stock consisted of horses, cattle, sheep, asses, mules, and swine, and they were extensive breeders of poultry; they also paid much attention to bees and fish, the latter they reared in ponds and sold for a high price.

The plants cultivated at present were, with very few exceptions, known and raised by the Romans. All the cereal grasses, wheat, oats, rye, &c., with beans, peas, vetches, and lentiles; the herbage plants, particularly clover and lucerne, and of course the natural grasses. They also knew and cultivated flax, hemp, and other plants for oil; and grew the turnip and rape successfully. They knew the proper manure for, and understood the necessary culture of these crops. All the common garden vegetables, with the exception of the potato and a few others, were known to them. Their fruit trees, which were cultivated largely in the gardens of the rich, were similar to those known at the present day, with the exception of the orange, the pine-apple, and the gooseberry; but the vine and the olive-tree were the most extensive and general.

The Roman implements and machines were neither so numerous or complicated as ours, but what they used, though simple, appear to have answered the purpose well,—the plough, on a very plain principle, but of various kinds, according to the purposes for which it was required; the harrow, and a kind of brake or grubber, for tearing and breaking down rough ground.

They used hand rakes and hoes of different kinds, the spade and shovel of a peculiar construction; hatchets, grubbers, and pruning knives, sickles, and reaping-hooks; reaping machines are also mentioned, with various implements to thresh by hand, clean corn; wine and oil presses, and others used in domestic affairs.

Such were the chief agricultural operations of the Romans; and the reader will be struck with their superior skill and practical knowledge of the various necessary farm operations. A few of their maxims will further illustrate and prove the eminence they had attained to in the knowledge and practice of this most important art.

*"To sow less and plough better."* This maxim indicated that the extent of farms ought to be kept within proper bounds. All their eminent writers agree, that large farms are prejudicial. *"There should be limits and measures in all things."* *"You may admire a large farm, but cultivate a small one."* *"The land ought to be weaker than the husbandmen."*

There were many stories and sayings, showing that *more was to be gained by cultivating a small farm well, than a large one indifferently.*

"A certain freedman having much better and larger crops than his neighbours, was accused of witchcraft, and put upon his trial. He produced in court a stout daughter, some spades, and other implements of an excellent construction, with his oxen, and said, 'These, Romans, are my charms.'" He was of course acquitted. All the Roman authors abound in such maxims. Virgil's *Georgics* is a particular example.

It may be thought strange, that at the end of more than 2,000 years, we can boast of little more knowledge in agriculture than the Romans, and in general not at all so much; but on further consideration this can be satisfactorily accounted for. It appears that agriculture had begun to decline some centuries before the empire was finally broken up. Before the reign of Augustus, the historians complained that the causes of decay were in operation. The lands were absorbed by extensive and wealthy proprietors, who dwelt in the city; living

in an expensive and luxurious state, having no personal care or superintendence over their property, delegating to strangers what ought to be their own duty, letting their lands at rack rents, to support and maintain their enormous expenditure; oppressing their tenants, the occupiers, and eventually exhausting and deteriorating the soil.

Before the seat of empire was transferred from the western capital, agriculture was at a low ebb indeed; and finally, when the barbarians overran and conquered the empire, it, like every other art and refinement, was prostrated, and was only preserved from total annihilation on the lands and within the precincts of the churches and monasteries, the superstition of the barbarians respecting these sanctuaries. On these lands, therefore, during the middle ages, a period of more than 1,000 years, the only vestige of early agriculture was known and practised, and by these means has been handed down to the present generation in the several countries of modern Europe.

---

### CHAPTER III.

#### MODERN AGRICULTURE.

IN a work such as the present, it would be unnecessary to go on and trace the progress of agriculture from the fifth to the fifteenth century, in the different nations of Europe, or even from the latter era to the present day. Such inquiries would be more curious than useful. Those inclined to obtain such information can be fully gratified, by the perusal of many excellent works, which have been published, going into detail, and recording everything worthy of notice as supplied by history during the different periods.

The greatest impediment to the advancement of the science and practice of agriculture in every age and country is war, particularly intestine broils. Every

country in Europe is still suffering under this infliction. The civil broils in the United Kingdom during centuries diverted the people from useful pursuits and peaceable objects. The blessings of peace, enlightenment, and the rapid spread of education will, we hope, eradicate all such barbarous and inhuman feelings from every part of the world, and the great family of mankind will pursue objects worthy of ambition.

It is well known that the lands belonging to churches and monasteries, during the middle ages and up to the sixteenth century, were by far the best cultivated in every country in Europe, and to these religious communities we owe the greater portion of the knowledge we at present possess. These superintended their own concerns, worked with their own hands, and skilfully; gave employment, supported the poor, and their tenants or undertakers were better treated and more comfortable than any others.

Though we think it unnecessary to trace the rise and progress of agriculture in modern times, it may be very important to take a short view of the practices most prevalent, the crops that are cultivated, and the general state of the agricultural world, or at least that part of it which has been most celebrated for superior science and practice in our time.

In every country and even locality, good and bad cultivation will be found; but from the rudest management and most unskilful farming, a useful hint may sometimes be obtained.

Europe is undoubtedly that portion of the world where the knowledge and practice of this art is best understood. The skill and industry of the Chinese have enabled them, from time immemorial, to raise from a soil not of the best description, the subsistence of an immense population. Necessity has forced them to cultivate to the mountain tops, and their numbers have enabled them to do so minutely, and in detail. Manual labour will always produce the greatest returns. Their climate, soil, and products being so dissimilar to ours, but few of their operations, or a knowledge of their agriculture, could be of much importance to us, except

in one particular, their extreme anxiety and care in the collecting, management, and application of manures of all kinds. In a country where few cattle are kept this becomes the more necessary.

The Irish, like the Chinese, ought to be most careful of their manures, and enter into the minutiae of husbandry, where we are confined to a small space, with a dense and accumulating population.

The agriculture of the New or Western World must of course be similar to that practised in Europe—in the Mother States, from which the emigrants and early settlers were derived, varied by the changes of soil, climate, and natural products.

In the United States, where the great majority of the inhabitants were originally from the United Kingdom, and where the soil and climate are somewhat similar, we find that the practices and modes of culture are nearly the same. Their implements, cattle, and natural products are similar; but, as in every other country, there is a vast deal of both good and bad management. The exertions of the Government have done much to improve it, and are calculated to accomplish much more. They are endeavouring to ascertain and introduce the best practices of Europe, besides encouraging local agricultural societies and schools.

Agricultural improvement will always be slow where land can be obtained cheaply and in abundance, and where the population is comparatively thin. In such cases there is not the stimulus of necessity, a circumscribed surface, and dense population, compelled to extract the greatest quantity of produce from the smallest portion of ground.

The best encouragement to superior cultivation in America would be ready and remunerative markets for produce, which can only be obtained in certain localities, and under peculiar circumstances, where trade and commerce flourish.

In all new countries, and unfortunately in some of the old, we find the landholders or farmers over-burdened with too much land, more than they can manage and cultivate properly, more than they can stock and



labour to their own advantage, or that of the public. This grasping and monopolizing disposition in mankind is natural, prevails everywhere, begins low, even among our own small, uneducated, poverty-stricken farmers in Ireland; this has produced that unreasonable and foolish competition for land, that has done so much evil, and is still producing such direful effects.

Another reason why a superior degree of agricultural knowledge and practice must be of slow progress in America is, the greater portion is comparatively a virgin soil, rich, requiring little manure or exertion to cultivate it after it has been cleared and reclaimed; and a great number of the most energetic, persevering, and experienced farmers, instead of settling down on a moderately sized farm, making it a permanent residence for themselves and families, cultivating correctly, and showing good examples, make a trade, and sometimes a considerable fortune, by clearing, reclaiming, and selling lands so semi-cultivated to newly arrived emigrants, or persons less skilful and not inclined to undergo the laborious and disheartening task of clearing brushwood and felling forests. Ultimately, however, if peace prevail in the old and new world, and emigration flow on from Europe to the different states in the ratio it has hitherto done, the great American continent will become a prosperous, well cultivated, and important portion of the globe; but unfortunately, nations, like families and individuals, are led astray from their true interests, by avarice, ambition, and monopoly.

Though the defined and recognised territories of the United States are immense, a great portion uncleared and unoccupied, a greater portion but partially so; yet we find these people grasping, longing, and seeking for more. They would risk the peace of the world, their own prosperity and best interests, to gain an increase to their already gigantic possessions—a barren mountain, a wild forest, a disputed territory, almost untenanted, uncultivated, or a neighbouring independent state. It is a pity that statesmen would not read the history of the world and learn wisdom.

Our colonial possessions in different parts of the

world are somewhat in like circumstances with the United States, but, with the exception of Canada, greatly behind in agricultural knowledge, where they are, by emigration, more closely inhabited, and from the mother country; and when the rising generation at home have been taught superior knowledge and practice in agriculture, we may anticipate prosperous colonies, inhabited by a happy, thriving, and loyal people.

We may now return to Europe and endeavour to give a short sketch of farming in some of the principal kingdoms and states, which are considered most in advance in the art, and from which we may glean information, particularly as we know so little ourselves and are so far behind our neighbours.

#### AGRICULTURE OF ITALY.

In a country so diversified in climate and soil as Italy, and inhabited by so many different (we could almost say distinct) races of people, the modes of culture and products will necessarily be very different, and many of them to us quite uninteresting; but as the greater portion of the lands of the best description is divided into small farms, sustaining and employing a large population, besides returning a high rental, it may be instructive and interesting to ascertain how this is accomplished.

The best cultivated parts of Italy are Lombardy and Tuscany; but taken as a whole, it is the most fertile country in Europe, producing almost everything in perfection that is to be found in any other, viz., cotton, silk, wine, oil, all the various fruits and vegetables, corn and grasses of every description, the produce of cattle, meat, butter, cheese, poultry, &c., and supports a population, according to the surface, greater perhaps than any in Europe.

The soil of Lombardy is partly alluvial, rich, and level, and from the practice and facility of irrigation is amazingly productive, almost inexhaustible; not alone grass, but all their grain and other crops, even their gardens, are irrigated.

Perhaps no other country could bear the scourging rotations that are carried out here; six or seven exhausting crops in succession, and not uncommonly three or four of the same kind, such as wheat or rice, following each other. There is no doubt that an immense change for the better might be effected in this respect; this shows the want of education, and the force of custom and prejudice.

The cattle of Piedmont are chiefly house-fed, and with great care; they are occasionally rubbed with oil, bled, and at least twice in each day combed and brushed. They seem to repay this care well, and their produce is an important consideration. The celebrated Parmesan cheese is produced from the dairies near Lodi. Sheep are not commonly reared in the valleys, and even on the hills they are much neglected; on such a fine soil and climate, and with any kind of correct attention, there can be no doubt they would pay the farmer well.

The lands of Lombardy, Tuscany, and in general over Italy, are divided into small farms, in Lombardy from 10 to 60 acres, some few in the hands of proprietors are larger.

The tenancies are looked after by a factor or bailiff on each estate, who pays attention to the cultivation, and repairs of housing, &c., pays taxes, tithes, and sees that the landlord gets his share of the produce, which is the *one-half*, and in kind. The tenants or occupiers are chiefly what are called *metayers*, or half and half men. The landlord pays the taxes and repairs the buildings, the tenants provide cattle, implements, and seed, and the produce is divided, and to the smallest value, even the eggs. Some few farmers have short leases and pay fixed rents. The metayer tenants are respected, seldom or never changed—the farm descends from sire to son; but they are not permitted to alienate or subdivide the land. As may be supposed, they seldom get rich, but they appear happy and contented, and that is enough in any country.

The products of Lombardy are wine, silk, some oil, the various grain crops, wheat, oats, barley, rye, rice, maize, millet, panic, with flax, hemp, lupines, rapeseed;

and their forage crops, the various grasses, clover, lucerne, sainfoin, &c., with the produce of their cattle. They have an abundance of delicious fruits, with the common vegetables.

Their implements are few and rude, their plough is much so, but on hand culture they chiefly rely, which is one great cause of their success.

#### AGRICULTURE OF TUSCANY.

The agriculture of Tuscany, in the valleys, is similar to that practised in Lombardy, and the crops are also alike. There is one particular practice carried out here, which is not common in Lombardy, viz., repeated trenching with the spade, and to which the extreme fertility of the soil is in a great measure attributed. Maize is the most important crop, as supplying the chief food of the people. The agriculture of the slopes or hills is altogether different from that of the valleys, as are also the products. Any description of the culture of the vine, the olive, and the mulberry, would be more curious than useful to the Irish farmer.

In all parts of Tuscany the tenants are half and half men, or *metayers*; some few have leases and fixed rents. The farms are smaller than those of Lombardy, being from five to ten acres; their houses are substantially built, and have a very respectable appearance. As may be expected, where there is such a minute division of property, the population is very great; and, notwithstanding their extreme industry and rigid economy, they live very poorly, never tasting flesh meat, except on Sundays; the general food on other days being such as the farmers of this country, or even their servants, would by no means relish.

There is one habit or custom which has almost become a law where the small tenant or *metayer* system prevails, particularly in Tuscany,—the farmers are not permitted to divide their property among their children, therefore it is seldom that any of the family but the oldest marries; and when the father dies, he succeeds to the property, his brothers and sisters living with and

working for him, until they die off and are succeeded by their nephews and nieces. We fear such a custom or law would be difficult to enforce in Ireland.

#### AGRICULTURE IN THE NEAPOLITAN TERRITORIES.

Notwithstanding the fertility of the soil in this volcanic region, it appears badly managed, and the occupiers or metayers wretched in the extreme; their farms are in general small, not over five acres, which they cultivate with the spade, but only receive *one-third* of the produce for their pains. They live very poorly, chiefly on maize, fruit gathered from the hedges, and a few common vegetables. This country affords a strong example of what ignorance and oppression will produce, under the most favourable circumstances. The climate and soil are capable of producing and maturing almost every plant and vegetable for the sustenance of man and beast, and in great abundance. Were it in the hands of an educated and intelligent race of farmers, who could avail themselves of the natural advantages offered, adopt judicious rotations, introduce the best and most profitable crops, cattle, and other domestic animals, suited to all circumstances, the resources of this naturally fine country would be almost unlimited. But such is the nature of things and the ways of the world, that we seldom, if ever, find an enlightened and intelligent community of cultivators settled on and possessing a naturally first-rate soil. In the agriculture of the other States of Italy there is nothing particularly worthy of observation, or very different from what we have noticed. The two first divisions, Lombardy and Tuscany, are far in advance of any other portion of the Italian States.

#### SWITZERLAND.

A country so peculiarly situated in point of climate and soil, its agriculture must necessarily be peculiar; and though simple and of a primitive kind, the Irish farmer could from them obtain a useful lesson, could he

be induced to imitate the Swiss in *industry, perseverance, and economy.*

Pasture, the care of cows, sheep, and goats, are their chief objects, though they labour their half sterile soil with care and skill, where it is at all susceptible of cultivation, and as they are in general the proprietors themselves, as well as occupiers, have the greatest of all stimulants to improve and cultivate their *own* lands. This is perhaps one great reason why these hardy mountaineers appear so happy, contented with their lot, and attached to their country; though that lot may appear hard to persons differently situated and circumstanced, they look down with scorn and pity on their German neighbours, inhabiting a fertile country with a genial climate, but who are dragging on the lives of serfs under their tyrant taskmasters—the great landed proprietors.

The Swiss are said to be extremely expert in the management and saving of their grain and hay crops; they will necessarily be so in a climate so ungenial and uncertain, and where the food of their cattle is of so much importance. Whether it is that travellers from want of practical knowledge are unable to discriminate and enter into details, we are not certainly in possession of facts to show that in the harvesting of their hay and corn crops, they have superior systems to what are generally practised in the best cultivated parts of the United Kingdom. The collection, care, and management of manure, particularly *liquid*, is another peculiarity in their economy; where the system of out-door feeding and pasturage prevails, this becomes absolutely necessary.

The chief produce exported from Switzerland is cheese, and for the manufacture of this they have been famed for centuries. The return from this is the wealth of the husbandman; it is of various qualities, and generally takes its name from the locality in which it is made. When we come to speak of cheese we shall enter more fully into the Swiss management.

## AGRICULTURE OF GERMANY.

*Loudon* says, that the agriculture of Germany more closely resembles that of Britain than either France or Italy; and this may be correct so far as relates to some of the Northern and Western States, Denmark, Hanover, Friesland, and the countries bordering on the Elbe; but, taking Germany as a whole, the agricultural condition of the two countries is altogether different. This must necessarily be the case if there were no other causes than the dissimilarity of climate, soil, and products; but what, perhaps, makes a wider distinction still, is the different states of society, and the tenure and conditions upon which the land is held. Another great reason why England is altogether different from any purely agricultural country is, the immense advantage her agriculture derives from a numerous, wealthy, and thriving population of merchants, mechanics, and artizans, who are collecting riches from every part of the globe, a great portion of which must be expended on agricultural produce—the common necessities of life; it is this gives the great stimulus to English agriculture, and renders the proprietors and occupiers so wealthy and respectable. The most fertile and favoured country in regard to soil and climate will not progress in wealth and agricultural eminence, unless commerce and manufactures create an extra demand for the produce of the soil; this will be fully proved and borne out by comparing England with France, Germany, and the other Continental States; or by comparing England with Ireland. England is well cultivated, for the tenant farmers are capitalists, and have every means of applying skill and labour advantageously. They are rich from having a ready and remunerative market at their doors. It is erroneously supposed that the chief reason of the agricultural prosperity of Great Britain arises from the division of land into large farms—this is not the true cause; England would be immensely better cultivated, would yield a much greater produce, the agricultural population would be in a more safe,

comfortable, and contented condition, the whole body politic would gain advantages by a better distribution of the land among the people, a more minute division among all classes of cultivators, enabling the skilful, energetic, and industrious labourer to raise himself to eminence and respectability, as his neighbours in the mechanical or manufacturing line may do.

The great extent of Germany, the difference of climate, soil, and capabilities, the numerous states into which it is divided, under various laws, habits, and customs, imply a variety in its agricultural operations.

One great cause which has much tended to impede improvement is, that much of the landed property is held on *feudal tenure*, and strictly entailed on the eldest son.

The sovereigns, religious bodies, and even civil corporations, hold extensive domains, which they farm or let out in various ways. The farmers are in most cases metayers, but of various kinds; in some parts they do not find stock, but are mere serfs or labourers. This is particularly the case in the Austrian dominions. In Hungary a few nobles have immense estates, which they manage by a regular and well-disciplined staff of agents, bailiffs, accountants, and their underlings; but it is problematical whether these gentlemen farmers are fairly remunerated. In some states the occupiers hold at fixed rents and pay in kind; in others the property is free, as in England, and in such cases the state of agricultural knowledge is much advanced.

There is one peculiarity in the holding and tenure of land, which has an effect in parts of Germany on the general state of society; a rule which forbids the *union* of farms, prevents monopoly, and keeps the people more on an equality. If there are few rich there are few very poor; there are no extremes; "the metayer system, if not favourable to wealth, prevents destitution."

As is always the case, where few cattle are kept, according to the surface of a country, the land is poor and badly cultivated. This is particularly the case in Germany; their subsistence chiefly depends upon their grain crops, and they exhaust the land with these and



such like, and then it must rest in the bare fallow. Their rotations are the three-course, two grain and one fallow, and on poorer ground three grain and two or three years rest, or lying producing weeds. In some districts where superior knowledge has crept in, green fallow crops and the cultivated grasses are raised. The people are, however, rapidly advancing in agricultural knowledge: for during her Majesty's visit to Germany in 1845, it was remarked that the districts bordering on the Rhine were in a high state of cultivation, and the inhabitants apparently comfortable and happy.

Their operations are in general awkward and badly performed, and their implements few and ill made. Some spirited individuals have been introducing implements from England and Scotland. The country, however, is in a rapid state of improvement: several seminaries, some of them very extensive, have been established, for the purpose of teaching the higher classes the science and practice of agriculture.

The celebrated Von Thier established his college under the auspices of the Prussian King, and the same Government is endeavouring to extend the blessings of the same kind of education to the lower orders in the public national schools.

#### AGRICULTURE OF RUSSIA AND POLAND.

Little can be said of the agriculture of Russia and Poland. Though inhabiting a fertile soil in an eminent degree, and a climate at least steady and not ungenial, we find the masses poor, indifferently fed, and clothed. All the worst practices of Europe are in operation here; their modes of management absurd, the succession of grain crop and fallow; their implements rudely formed and of the worst description; their cattle thinly scattered and indifferent; and, so far as we have been able to collect information, there is nothing connected with their farm management worthy of observation.

## SWEDEN AND NORWAY.

The agriculture of Sweden and Norway is somewhat similar to that of Switzerland; cattle and pasture receiving the greater attention, but latterly agricultural improvement has progressed rapidly. The late King, among his many other measures for the enlightenment and amelioration of his people, encouraged agriculture in various ways, and his son, the present reigning Sovereign, is following the same course with much assiduity and great success.

Schools and institutions, where agriculture will be taught, are being brought into operation, and model farms are being established even in Norway. In the latter, only a few years ago, the products were few and scanty; large importations of food were annually required for the inhabitants. Oats, barley, and rye, were the chief products; but at present, by the cultivation of the various green crops, potatoes, turnips, &c. &c., a happy change has been produced. Their soil and climate have been found well adapted to these latter crops, and this is a happy illustration of what industry and skill may accomplish by judicious cultivation, selecting, adopting, and alternating crops suited to the soil and circumstances, and a further proof that almost every country is capable of sustaining its inhabitants, if, like the Swedes and Norwegians, they are virtuous, peaceful, and industrious.

## SPAIN AND PORTUGAL.

We turn to a country which contrasts most singularly with that which we have been describing—a country, from its soil, climate, and natural advantages, capable of the highest state of cultivation, civilization, and happiness; but from the pride, ignorance, indolence, and restlessness of the people, far behind the hardy and industrious mountaineers of the north in comfort and rational enjoyment. The almost continued wars and intestine broils in which these people have been engaged, and are still involved, have impeded the progress of

agricultural improvement, and have habituated them more to bloodshed and rapine than industry; and even should such turmoils cease and peace prevail, it is questionable whether the inhabitants of the peninsula will attain a high degree of excellence in the cultivation and management of their soil, at least so long as they retain their indolence and other pernicious habits.

Of all the countries of Europe, or perhaps the world, none possess more advantages for superior culture than Spain. Almost every plant that is to be found, from the Equator to the Poles, will not only grow there, but thrive in a state of the greatest luxuriance. Agricultural plants, in particular, arrive at great perfection; notwithstanding the inattention they meet with; and in some few instances, where the cultivation of the green fallow crops, potatoes, turnips, rape, &c., with the cultivated grasses, have been tried, they have been particularly successful. Were such improved system generally followed out, it would become a most interesting and productive country. As it is, the natural fertility of the soil yields a pretty general supply of common food to the people, and the exports of their valuable products, wine, oil, fruits, silks, wool, &c., return a considerable revenue.

There is nothing worthy of imitation in the Spanish modes of farming; their customs and habits are rude, and their implements few and unworthy of observation. Like nearly all the continental countries, they have few cattle, and of course a scarcity of manure; but the great fertility of the soil, and frequent irrigation, in a great measure compensate for this. They have, however, very superior mules and asses, with goats in abundance; and they have long been famous for their sheep and wool, the celebrated Merino breed, of which they are justly proud, and of which they take the greatest care.

#### FRANCE.

From the superior soil, climate, and natural advantages of France, it ought to rank as the highest agricultural country, not only in Europe, but of the world. This,

however, is by no means the case. It is confessedly far behind many others on the continent, though its facilities for eminence are altogether greater. The reasons for this state of things are quite obvious. War, the greatest enemy of civil and social improvement—the almost continued domestic and foreign broils during centuries in which the people have been engaged, have been the chief obstacles to the internal improvement of their fine country. The minds of the people have been led astray. Directed into a vicious course, they have pursued objects unworthy of humanity, opposed to their true interests, to the welfare and prosperity of their country. This has been the leading and prominent cause, from which many minor evils have sprung, all tending to retard improvement.

The low state of manufactures, the slow and expensive modes of transmitting produce, the want of railroads and canals, the want of competent education, have led to a state of things altogether unfavourable to improved and successful cultivation. Though these causes have been long in operation, producing their natural results, a comparatively backward and low state of the science and practice of cultivation on a particularly favourable soil, and among an enlightened and clever people, there is no doubt the French are alive to their position, their prospects, and their duty. They are sensible of the advantages they possess,—a fertile soil and an industrious rural population,—a population, the greater number of which are the proprietors as well as occupiers of the soil, having the greatest of all inducements to improvement on their own estates. The Government is conscious of the necessity and importance of education, and is making strenuous efforts to encourage it, to improve the breeds of cattle, and everything that may tend to place the agriculture of the country upon a better system. This is the result of peace, which, if it continue, will undoubtedly make France what she ought to be, and what she possesses all the elements of—a great, a prosperous, and a happy country.

It has been stated by the best authorities, that four-fifths of the occupiers of the land are also proprietors,

This might imply to us that the tenants or occupiers are gentlemen, living in a state of affluence, which is by no means the case; the law and custom which enables a man to divide his land among his numerous family, must lead to a minute subdivision altogether incompatible with a wealthy and respectable yeomanry such as we have in Great Britain. This subdivision will eventually be counteracted by the liberty of free sale and transfer, so that they will have rich and poor, extensive farmer and poor labourer as in other free countries; at present, however, there appears to be in the greater portion of France a happy equality. If there are few rich there are few poor. The French farmer aims at mere subsistence, the English farmer to achieve a fortune, an independency.

Among the customs in France which are unfavourable to agricultural eminence, one is particularly prominent: of all the small farmers, and this comprises the greater portion of France, few have their houses or reside upon their land, but in small towns or villages, in many instances at a considerable distance; this must always be exceedingly inconvenient and unprofitable. In the first place, there is a great waste of time passing to and from the labour, much extra expense in carrying even their scanty manure; cattle in such cases cannot be kept and properly attended to, nor the necessary watchful attention be paid to crops and farm concerns. In the greater portion of France, farms are not laid off separately by fences, as in this country, but all apparently in common. Such a custom must always be unfavourable to improvement: in the north, however, where improved modes of management have been long adopted, also in Normandy and Brittany, the dairy districts, many of the farms are large, enclosed, the housings situated on the farm, and managed somewhat as in England. Generally speaking, however, they are far behind Great Britain in successful and profitable culture, in the breeding and management of cattle, sheep, &c., in the variety and efficiency of implements, and the necessary working of the soil and produce of crops. The great want in France, like all the contin-

ental states, is the proper and necessary quantity of cattle, consequently a scarcity of manure, and eventually deficient crops; they have to resort to the usual mode of recruiting their soil, the bare summer fallow, which they manage very badly.

Besides all the common crops of this country, they are able to raise the wine, oil, silk, maize, and the valuable fruits for export. France has within herself, not alone all the common necessities, but almost all the luxuries that man can desire.

There is in France, Switzerland, Germany, and many other parts of the continent, a very peculiar and (to us) singular custom, of collecting the leaves of the chesnut and other forest trees for the food of their horses and cattle; it can only be from necessity and the want of better food that such a practice originated and exists. It is not likely we shall follow the example; we incline to provide a more substantial and wholesome provender.

---

## CHAPTER IV.

### MODERN AGRICULTURE.—HOLLAND.

THE last countries on the continent of which we shall take notice are Holland and Belgium, and though last, certainly not least. The chief reason why they have been mentioned at the close of our remarks on the continental farming is, that their admirable example for persevering industry, and correct management, may stand prominently forward, and be impressed on the minds of our countrymen.

There is nothing very peculiar in the farming operations of Holland. Their chief object is dairy management, and the providing their cattle with sufficient provender at all seasons; in these points they excel and have long been celebrated. They realize a large annual revenue by the export of butter and cheese, chiefly to England, but recent experience has proved that in Ireland, by a little

extra attention and skill, we are able to compete with them in the quality of butter, and there is no doubt the same would occur with cheese, did we turn our attention fully to that subject.\* The Dutch, however, are an exemplary people, and are justly esteemed for their honesty, sobriety, and every domestic virtue.

#### BELGIUM.

May be justly termed the model farm of Europe, and though by no means a superior soil or climate, the more than common skill, perseverance, and indefatigable industry of the people, have enabled it to support a dense population during centuries, in comfort, respectability, and independence. It is a singular fact, and worthy of deep consideration, that is not on the best soils, or under the influence of the finest climates in Europe, that agricultural improvement is carried out best, and the people more comfortable and happy, but the contrary is the fact. Belgium is a strong instance of this, as well as our own unfortunate Ireland. In Belgium itself there is convincing proof: it is on the poorest soils where the best cultivation is practised; on the rich, deep alluvial polders, the management is slovenly enough.

It may be thought singular that this small country should be so far in advance in the practice of agriculture beyond any other of the continental states. It is known that trade and manufactures flourished in the low countries so early as the fifteenth century, and as a matter of course, agriculture also; the produce of land was in great demand, and at remunerating prices, the greatest of all stimulants to superior cultivation. They had but a very limited space to work on and support a numerous population, therefore every exertion was made to raise the greatest quantity of produce from the small portion of land. The produce of cattle was in the greatest

\* In the counties of Down and Antrim, at the present time, butter is made and sent to England, and competing successfully with the best Dutch and Belgium in the London market.

demand, and was found the most valuable, but by the old pasture system comparatively few could be kept, unless a large quantity of the land were in grass, and this would make grain and vegetables scarce, therefore the important system of house-feeding was adopted. Artificial food was raised for this purpose, and found to answer well at all seasons; clover, lucerne, sainfoin, &c., for the summer, with various root crops, such as turnips, carrots, parsnips, with colza or rape, for the winter and spring. By minute and incessant labour, and by extraordinary manuring, they are able to raise such crops in great abundance, even in their poorer soils, and in many instances two of these crops are taken off the same land in the same year, turnips, rape, &c., after grain, and root crops, such as carrots and parsnips, under the grain. They also use every available kind of artificial boiled food, with the refuse of breweries and distilleries, to keep up the condition and produce of their cattle. With such skill and attention they found them to thrive and to milk better during the different seasons, than they had done on the pasture: but another discovery of still greater importance was made. Their light soils, under continued cultivation, required an increased quantity of manure; this was supplied in abundance by the house-feeding. Cattle fed on the most nutritious vegetable food evacuate a proportionate quantity and quality of dung and urine. This was carefully collected in reservoirs and tanks, the solid matter mixed with every decomposable substance, such as weeds, light earth, sweepings of streets, &c., &c., and the urine thrown over it to ferment and decompose the mass. They found manure in the liquid state to produce the best crops on their light soil, or perhaps on any soil. They resort to the towns and villages, for the excrement and other valuable offal, which is always in abundance in such places; there it is carefully collected and sold to the farmers, who carry it to the tanks and mix with the other manures of the farm, constituting a most powerful and stimulating mass for every kind of crop. The extreme cleanliness and health of their towns arise chiefly from this, the removal of all kinds of filth for useful purposes. From



this, more than any other cause, arises the great success of Belgian farming.

Again, land, particularly a light soil, is found to deteriorate, to tire as it were, of constant cropping, no matter how well managed, or how judiciously the crops have been alternated. The usual remedy for this has been to lay down the land to rest in pasture a number of years; but the Belgian farmer cannot afford to follow this course, he cannot spare any portion of his land to lie in unprofitable pasture, nor can he afford the bare summer fallow, so much practised in other countries. He rests and cleans his land by another process; he meets the difficulty by trenching with the spade, and bringing new soil to the surface. When the upper portion of his soil is exhausted or dirty, he throws it down, and brings up a new and vigorous strata, puts it in requisition during a rotation, a certain number of years, when it is again permitted to go to rest, like the sentinel off duty. Besides resting, the great depth thus produced enables the plants to stretch their roots, the water to pass down and up, the air and heat to enter; the consequence is, luxuriant crops on all soils. Farming in Belgium is gardening with us, and this is the great secret of their success—they carry the best system of the garden out into the farm. Another and great cause of their success is their indomitable energy, perseverance, industry, and economy, without which no nation or country will ever attain to agricultural eminence, no matter what other qualifications they may possess.

As may be supposed, where the garden system of culture is so strictly pursued, the implements are few and simple; this is particularly the case in Belgium—the spade is there the important implement on which they chiefly depend; it were well if Great Britain would take a lesson from them on this point. If farmers of the latter country discarded a mass of their cumbrous machinery and implements, the great aim of which is (with a numerous and expensive train of horses) to supersede human labour; if they would employ the ~~same~~ <sup>mode</sup> to cultivate, as the Belgians do, minutely with

the spade, we should hear less of short crops, bad harvests, starving, unemployed labourers, excessive poor-rates, and agricultural distress. Corn laws and tariffs would be a bye-word, and the United Kingdom would be an exporting country.

No country on the face of the earth presents so worthy an example to Ireland as Belgium; their condition and circumstances are in many cases similar. Like Belgium we have a limited space and a numerous population—therefore the great necessity of following correctly so good an example; we have, also, numerous towns and villages, consumers of produce, and at our doors the greatest commercial and manufacturing population in the world, able and willing to purchase and pay for our produce; but we have a much better soil, and, unlike Belgium, we have a wretched, idle, half starved population; we have crime of the most heinous description, we have the poor-houses crowded, the face of the country covered with mendicants, with discontent and turbulence on all sides. Like Belgium we have the small farm system to a great extent, with an abundance of hands to cultivate minutely; but we are ignorant, indolent, and careless, idle and poor; we do not avail ourselves of the natural advantages we possess. The system of Belgium is precisely that which we ought to pursue, a system, the excellence of which has been proved by the lapse and experience of centuries, and which contains the cardinal points of successful farming, adapted to every climate, soil, and situation; a system that has enabled this people during such a lengthened time to raise, from an indifferent soil, abundance of sustenance for a numerous population; and from their own resources, without the extraneous aid of imported manures, bones, or guano, raising abundant crops, living in comfort and respectability, without workhouses, poor-rates, or paupers.

It is not to be understood that the Belgians have attained to a state of perfection, even on their own system; they might improve it marvellously by deviations from their old customs, but, like farmers generally, they are prejudiced in favour of old opinions and habits, which they look upon as infallible.

## CHAPTER V.

## AGRICULTURE OF GREAT BRITAIN.

WE now come to England—wealthy, happy England; the cultivation and appearance of which have been the admiration of the world; and certainly the farmers of Great Britain, taken as a whole, in point of wealth and respectability, cannot be equalled, or even approached, by the same class in any other portion of the globe.

The Englishman of any class or station will not be contented to remain in humble or ordinary circumstances, if skill, perseverance, and energy will tend to alter his condition for the better; his great aim is advancement and the accumulation of wealth, and this is a noble quality, a praiseworthy ambition, if legitimately pursued, and in accordance with the interests and welfare of his fellow-subjects; it is this that has raised men from the humblest ranks to the highest dignities and honours of the state; and this is the beauty and advantage of our unrivalled constitution—that all are enabled to do so, unless under the adverse influence of circumstances, which, in many cases, the law nor constitution cannot grapple with. In Great Britain the great aim of the farmer is to make a fortune; on the Continent, in general, the same class are contented with a decent subsistence; this has, in a great measure, produced the difference in the appearance and circumstances of the farming community in different countries. But, unfortunately, in an agricultural point of view, the cause that tends to elevate one man, operates to depress or keep down many others; where one man has a great scope of land, in a country where it is limited, a great many more can have none. There the wealthy farmer contrasts sadly with the numerous poor labourers; for the latter class there is simply the alternative, the day's wages or the workhouse, beyond this they cannot hope to aspire, no matter what may be their virtues, talents,

or industrious habits. This is a dull prospect for a large portion of the inhabitants of a free country, but the monopoly of land produces this state of things, this serious evil; the great manufacturing towns may relieve the pressure for a time, but the danger to the state is a powerful reaction, a stagnation in trade, and these immense masses thrown idle. The strength and power of England, with her vast and numerous Colonies, will always be an industrious and well educated rural population.

The outward appearance and face of the country in England argues affluence and happiness. The extensive lands in cultivation and pasture, the waving crops of grain, or flocks and herds of the most beautiful and improved kinds of sheep and cattle, the correctly laid out fields, surrounded by well kept hedge rows, the villa or farm-house with the offices, exhibiting not alone comfort and convenience, but style and grandeur; all this strikes the stranger, the traveller, with admiration, and he pronounces the English farmer a great example to the same class in every country in the world. The practical and acute observer will admit the foregoing; still, when he examines minutely the true state of matters, when he hears the incessant clamour of the farmers and their friends for legislative protection, at the same time the manufacturing and commercial interests anxious for free trade and no favour; their constant complaint of accumulating distress and impending ruin; a large portion of the agricultural community, the labourers, unemployed, starving, or in the workhouse; the poor rates a serious burden; he cannot fail to perceive that there is something wrong—a state of things which ought to be changed for the better, and that the agricultural interest of Great Britain is not in that thriving and prosperous condition which outward appearances would indicate. He will next inquire whether this anomalous state of things arises from ignorance and mismanagement on the part of the tenant farmers themselves, or from causes operating to their disadvantage, over which they have no control; or partly from both. It must be confessed that the great object of

the more approved and profitable practices of the present time; he suffers inconvenience and loss by game; in many cases the withholding of leases and the uncertainty of tenure damps his energies and retards improvement; but of all other things, he suffers most from his own want of knowledge, his partialities and prejudices in favour of old customs and habits, which the more enlightened portion of the community are casting off and throwing aside: a great change, however, is taking place for the better.

At no period during the history of the United Kingdom has agricultural improvements been appreciated and followed up as at present. The numerous societies and farmers' clubs that have sprung up in every part of the country show the extreme desire of this important class for increased knowledge in the science and practice of their profession; and what is of the greatest consequence, it is a tacit acknowledgment that they are deficient in these essential qualifications. The great landed proprietors and gentry have taken an interest in the matter, and a course worthy of themselves. The Highland Society of Scotland, and the Royal Agricultural Society of England have already done much, and will do a great deal more to bring the agriculture of the country to its proper condition. Through their instrumentality a vast improvement has taken place in the breeding of all kinds of stock; likewise in the construction and use of improved implements. We have always regretted that these great and powerful bodies did not turn their attention to the education of the people; to the instruction of the rising generation in the important principles of improved culture—principles which may so easily be taught and inculcated in any school, and to all children, even of a tender age. The indefatigable and prudent people of Scotland, however, have not overlooked the great importance of this matter; they have taken up the subject of agricultural instruction, with a spirit and determination worthy of themselves, and will, no doubt, in a short time carry it forward successfully. Their peculiar sagacity enables

them to appreciate the importance of the subject. To a people who have so long excelled in superior practice, science is indispensable. The combination of theory with practice will always keep Scotland in the front rank.

---

## CHAPTER VI.

### AGRICULTURE OF IRELAND.

WE have taken a brief review of the agriculture of the ancient, and also of that practised in different parts of the world at the present time. In this course we have two objects in view. First, to convince our farmers of the present day that they are only in the infancy of the knowledge and practice of their profession, and that their predecessors, many centuries ago, and in different parts of the world, were much superior to them in these respects; and further, that at present, though the farmers of a county, a district, or locality may be satisfied that their system is almost perfection, and superior to that of any other, yet, on careful examination and reflection, a more extensive knowledge of the world, and what is passing beyond their own small sphere, they will have much reason for humility, and be satisfied that they have still great room for improvement.

Secondly, and what is of still greater importance, the history of the world, ancient and modern, proves that it is not the soil, situation, or other natural advantages possessed by a country that renders the inhabitants comfortable, happy, or rich, but that this depends almost entirely upon the *people themselves*. The inhabitants of Sweden and Norway, of Switzerland, Holland, and Belgium are more comfortable and happy than those of Southern Germany and Russia, Italy, or Spain, though the latter countries are blessed with nature's gifts in an eminent degree; nor are the farmers of the latter countries at all to be compared in point of intelligence,

wealth, and respectability with those of Scotland—cultivating a comparatively sterile soil, and under an uncertain and ungenial climate. It is the conduct and character of the people rather than the soil and climate of a country that confers comfort and happiness; their energy, perseverance, industry, and economy, combined with knowledge. These incontrovertible facts can never be sufficiently impressed upon the people of Ireland. Man ought, from infancy, to be taught to stand and look upright; to depend upon himself for a character and station among his fellow-men, and that his future welfare and success in life are best achieved by his own exertions. Without knowledge and discipline man is an indolent animal, and his sagacity is perpetually on the rack to find out plausible excuses for his neglect. With our Irish farmer this is particularly the case; procrastination is his great enemy; he has always some difficulty to contend with, or insurmountable obstacle in his way,—these difficulties and obstacles in a majority of cases his own creation. He is rack-rented; he wants capital; his land is poor; the seasons unpropitious; his crops fail; the laws are adverse, or not sufficiently protective; the Government is hostile to his interests; he blames every body and every thing *but himself*, and his grievances are magnified and trumpeted forth on all occasions; but it is our duty to pause and, if possible, determine where the blame rests, and whether these complaints are well founded. *His land is highly rented*; yet he will take more of the same quality, and at the same price, if he can get it; and he will injure or persecute a neighbour should he offer to take a portion of his trouble off his hands. *He wants capital*; yet he will not put in requisition the parents of all capital, his hands and his soil. *His land is poor*; yet he will not take the proper means of swelling his dung-heap; increase the quantity and house-feed his cattle. *The seasons are adverse, and his crops fail*; yet he will not take the proper steps to counteract bad seasons—drain and deepen his land. *He calls for, and waits on new laws*; like the waggoner in the fable, he lies in the slough and calls upon Jupiter. Thus, then, it will be

found, that all this formidable list of grievances—these crying evils, with a host of auxiliaries which we have not mentioned, arise from two simple causes—the man's own *ignorance* and *indolence*. These opinions and sentiments may be unpalatable to the great majority of the farmers of Ireland, but we wish to state facts, not to flatter prejudices.

If the soil, situation, climate, and other great natural advantages of a country, always confer comfort and happiness on its inhabitants, the people of Ireland ought to enjoy these blessings in an eminent degree. We have a peculiarly fine and fertile soil, a mild climate, a variety of other natural and particular advantages, with a numerous, hardy, and active population; yet we are not comfortable, nor happy, nor rich. We are poor (miserably so), discontented, and turbulent. The poorest of the continental states, in point of climate and soil, are not so wretched as we are. Belgium, with her dense population and hungry soil, is prosperous and happy. Scotland, with her wretched soil and climate, is also prosperous, annually increasing in wealth, in art, science, and trade. The great question for our consideration then, is, how does this anomaly arise? and what causes are in operation to prevent the Irish people availing themselves of the natural advantages of their fine country? and why are they so degraded and despised? It is of the deepest importance that we should form a correct idea of our position, that we discover the true disease, its seat and nature, that we probe the cancerous sore to the bottom, before we can safely prescribe an effectual remedy. This question has already been asked and answered in a thousand different ways, and as many different nostrums have been propounded for the cure, according to the knowledge, taste, prejudice, or interest of the quack, and by which means the whole subject has become so confused and complicated, that the clearest-headed philosopher or statesman can scarcely form a solid opinion on the subject; but in our mind the question, when divested of the crude absurdities which surround and are mixed up with it, is simple and of easy solution. Our disease is not of



that fatal or morbid, incurable kind, which it has been represented, but one of comparatively easy cure; and the more so, as we have the *medicine within ourselves, and the power to administer it*. Nay more, that this same medicine is in active operation, producing most important effects. The country is evidently in a state of transition, and a rapid improvement is going steadily forward. The simple question then rests here, does the poverty of Ireland arise from the situation of the country, her soil, climate, or other circumstances, over which the inhabitants have no control? or does it arise from the inhabitants themselves, from their ignorance, indolence, imprudence, and over which they *have* a controlling power?

We think that every intelligent man in Ireland will say that nature has done her great part for the country, but the people have neglected theirs. When we say the people, we mean *all classes, for all classes are implicated, from the peer to the peasant, from the landowner to the labourer*. The degree of blame to be attached to each class (for undoubtedly each class shares in the blame) would be a nice and delicate question, and it is not likely the several parties could come to an agreement on the subject, however they mutually recriminate and blame each other. The landlord blames the tenant for ignorance, prejudice, indolence, and sometimes dishonesty, and often (not without reason) attaches blame to the agent and his staff. The latter also, an important class, blames both parties, landlord and tenant; while the tenant again blames all the other parties for rack-rents, tyranny, oppression, want of encouragement, and all the *etceteras*. The politicians blame the Government and Parliament for not enacting a code of laws to correct all abuses, banish poverty and discontent, and without further trouble or delay restore happiness and prosperity to the country.

The landlord in every country, but particularly in Ireland, has a serious responsibility; the comfort and happiness, we might almost say existence, of thousands are in his power, and according as sound judgment and good feeling prevails over ignorance and something

worse; his tenantry are either happy or otherwise. Unfortunately for the country and this important class themselves, their early course of education has been anything but favourable to their after prospects. They have studied every art, science, and elegant accomplishment, *but the art of managing their own property.* This neglect of a most necessary education has produced serious loss and annoyance to themselves. Had they known the importance of early agricultural knowledge, and its effects on the productive powers of the soil, they would have had it taught and communicated to their tenants, and the consequences would have been, a rich proprietor, with a happy and prosperous tenantry. Unfortunately too often we behold a very different picture. Another gross and fatal error, arising from the same cause, and most generally committed in Ireland, is the appointing incompetent agents to the management of estates, in general more ignorant and self-interested than the owners. From this the very worst consequences have followed. An intelligent, scientific, and practical agent is a blessing to both landlord and tenant. He knows the true value and capabilities of the land; he exacts the fair value and no more; he is an agricultural instructor, and for this purpose his own farm should be a model for the estate. He guides and directs the tenantry in the several modes of cultivation, and sees them successfully carried out. In fact, the collection of rent ought to be the lightest part of his duties.

If we have been candid in pointing out the mistakes and errors of the proprietors of the soil, we must be equally so in reminding the cultivators that they are far from performing their duty to themselves or their landlords.

The acknowledged terms upon which a farmer takes his land are, that he shall manage it so as to pay the stipulated rent punctually, and have a comfortable subsistence for himself and family. If, when he takes such land, he is conscious he cannot act up to his bargain, has not the means or knowledge necessary for the task, he acts dishonestly, and robs another of his right. He at the same cheats a third party, who may be able and

willing to take the land and manage it with credit and profit; but he does more, he overholds and mismanages a portion of the soil, which ought to be affording food and labour for the community. On every principle of equity, therefore, and self-interest, the farmer is bound to be industrious, to use every exertion and means in his power to obtain knowledge and information on the best and most approved modes of cultivation, whereby he may extract the greatest produce from the land, enabling him to meet his engagements and live in comfort. If, on the other hand, he is indolent, prejudiced, persists in ignorance and bad habits, deteriorating the land, unable to pay his rent or meet his engagements, living in wretchedness, and content to do so, perhaps rearing up a family in those bad habits, a bad example to his neighbours;—in such a case the landlord has every right to the restitution of his land, and the benefit of a breach of bargain; it is the tenant who has committed this breach, and ought to abide the consequences. In duty to himself, to the improving tenants, and to the community at large, the landlord must make an example and substitute a better man. We know what has been the consequence of such proceedings, and what crime and misery they have produced and are still producing; but justice must prevail, and be extended to all classes. A combination of bad characters, banded together to invade the just rights of property, encourage and perpetuate old abuses and prejudices, stop the progress of improvement, foster indolence and crime, cannot be tolerated in a civilized country, but particularly in this, where the executive is all powerful for the repression of such, and the laws, though mild, are strict and efficient. It can only be the grossest ignorance, acting on a savage and unreflecting mind, that could prompt to agrarian outrage. Great crimes may be committed, individual cases of great suffering may be produced, and certain localities may be convulsed and inconvenienced for a time; but eventually a fearful reaction will take place, and recoil with terrible effect upon the heads of the authors of such outrages, here and hereafter.

There is a mischievous popular delusion abroad, which has been promoted and trumpeted forth by certain parties for the basest purposes. It is very wrong on two accounts,—first, because it is not true ; secondly, it tends to paralyze the efforts of the people in improving and bettering their condition. The evils of Ireland, among other fallacies, are stated to arise from *rack-rents*, the tyranny, injustice, and oppression of the landlords. There is not a word of the ignorance, indolence, folly, and mismanagement of the people. Now, as to rack-rents, there may be instances of such ; but this is the exception, not the rule. We distinctly deny that the general lands of Ireland are rack-rented ; and if agricultural education proceed and be diffused, as we trust it soon will, our position will be found correct. We grant that in most instances the rents are high enough, or too high for the majority of farmers, in their present state of knowledge ; but let system and superior practice prevail over the country, the present rents will be no trouble to the occupiers. This is found in all cases where superior culture has been adopted. When we look over the country, the state of the land, the crops, and modes of management, the marvel is how the occupiers manage to pay *any rent at all* ; but the low value of the land on his estate, is the penalty the landlord is paying for former neglect. As to tyranny and oppression, individual instances may occur—the absence of landlords from their estates, delegating the management to improper hands. We may even admit that instances do occur with individual landlords themselves ; but that the landlords of Ireland as a body, are either tyrants or oppressors, is altogether untrue. In a free country such as this, it must be in a very limited sphere where a tyrant can act ; and then what does he gain by his tyranny and oppression ? How shall an oppressed tenantry improve an estate, or their own condition ? Do we not see around us, in this country and elsewhere, that the landlord who pays attention, and encourages his tenantry by kindness, is always best paid ? Is there a landlord so stupid as not to see that the interests of himself and tenants are reciprocal ? He must feel if

he injures a tenant, he eventually injures himself; and though we have heard much of persecution, oppression, and the ejection of tenants, we may be permitted to say, that if the real facts were narrowly inquired into, and fairly stated, it would be difficult to find even individual cases of landlords injuring or removing really *industrious, honest, and improving tenants*. We will grant, that through ignorance and bad advice, the landlord sometimes goes far wrong; but it certainly is not his interest or desire to do so. The unfortunate state of political parties in this country, has very often done much to break up the connexion between landlord and tenant—to interrupt that mutual regard, kindly feeling, and good will which should always prevail; but such things are rapidly disappearing from among us, and in a short time will only be matter of history.

Tyranny is often used in a very wrong sense. Should an active, energetic landlord or agent, wish to improve the estate, and change the old system, he is immediately called a tyrant. It is considered the worst species of tyranny to interfere with their prejudices, antiquated notions, and absurd customs.

There is another subject connected with landlord and tenant, of the deepest importance to the progress of agricultural improvement in Ireland—a subject on which a very serious difference of opinion exists between the parties; I mean the granting or withholding of leases. In this respect we are in what “brother Jonathan” would call a *fix*. Our landlords will not grant leases because the tenants will not improve; and the tenants will not improve, they say, because they cannot obtain leases. Now this is a most anomalous state of things, and so long as it lasts, will seriously impede superior agricultural knowledge and practice, and the general prosperity of the country. Our impression is, that if the parties would calmly consider and reason on the subject, they might come to a fair understanding, and all these disagreeable differences be removed. There is nothing more evident or equitable, than that an honest, industrious, and skilful farmer, who permanently improves his farm or houses, or both, and

punctually pays his rent, is entitled to a remuneration and security for the money he expends in such improvements. Such monies are raised by his skill, his labour, and industry, and are therefore as much his property as the land is the property of the proprietor; and the proprietor who would turn out such an improving tenant, or appropriate to himself such improvements, by raising the rent in consequence, without a fair compensation in money, or a renewal of tenure at a fair rate, is clearly as guilty of robbery as the common highwayman. Any such example on an estate is most pernicious, and detrimental to the interests both of landlord and tenants. Again, when a farmer takes land, he does so on certain conditions. These conditions are principally that he shall pay a stipulated rent—improve, or at least not deteriorate, the land—keep the housing, fences, &c., in repair; and frequently he binds himself to make certain improvements. Now, if such person fail or neglect to fulfil his bargain, he has no right to hold the land. If he is indolent, ignorant, careless, and unthrifty; allows his land to remain wet, dirty, and poor; exhausts it by injudicious cropping; allows his fences and houses to get out of repair; and if arrears of rent accumulate, and he is unable to discharge them, he not unfrequently, besides becoming bankrupt, becomes reckless, and a desperate character, a pest in his neighbourhood and on the estate;—Can such a person expect encouragement by lease or otherwise? or what landlord in his proper mind would give a tenure to such a person? But we will suppose he is not an immoral character, but innocent and well disposed, yet ignorant, indolent, and a bad manager, by which his land is in such a state as we have described, no landlord will give a lease to such tenant, nor ought he to do so. Leases are, or ought to be, the rewards of merit, not of indolence and mismanagement.

If the landlords built the housing and made other permanent improvements, as in England and Scotland, a lease would not be of so much importance; but that system could only be carried out on large farms. A landlord might build a house on a farm of 500 acres, but would be unable to build fifty houses for as many.

tenants on the same quantity of land. The tenant farmers of this country ought to be exceedingly cautious in listening to and believing insinuations and misrepresentations regarding their landlords and their motives. There never was a time when the proprietors in general were so willing and anxious to improve their estates, and the people upon them, by education, the extension of knowledge, and other encouragements; and it is most desirable, for the success of such a great experiment, that they shall have the hearty, persevering, and strenuous exertions of the people themselves. If a mutual co-operation takes place between the parties, we shall see a wonderful change in the condition of all classes, and in a very short time. But if distrust, bad feeling, and a disinclination to come forward by either party, in the great work of regeneration, be exhibited, the consequences will be the continuation of poverty, turbulence, and suffering. It is the duty, then, of the tenant farmers to begin the good work, to shake off their old habits and prejudices, adopt the best modes of improving their farms, and eventually their own circumstances. It is a short-sighted policy to exhaust the land for fear of losing it. The improving tenant is always the landlord's favourite, and it is he who will and ought to get the lease. No prudent and feeling landlord will deny a lease to a deserving tenant. It is the best recompense for improvements, and a stimulant to further exertion. It renders the tenant and his family secure, comfortable, and happy. But on the other hand, leases granted to sluggards, will only spoil and encourage them in sloth and ignorance. Our next subject will be, what are the best means of improving the lands, and the farmers in general, of the country; and what are the most prominent and prevailing errors in their modes of management?

A foreigner, a stranger travelling through the United Kingdom, will be forcibly struck with the extreme dissimilarity in the appearance of the face of the country in different parts. In England he sees the extensive farm, the large fields bounded by straight hedge-rows, the alternate green and grain crops, the handsome villa

or farm house, with extensive offices, the comfortable looking gentleman farmer himself, riding his cob or blood horse over his grounds, and superintending his workmen. The traveller naturally says to himself, "Surely this is a fine country, and the people prosperous and happy;" and in this supposition he is in some measure correct. But he crosses the channel and lands in Ireland, and what a contrast meets his eyes. He travels for days before he meets a specimen of what he left in England; he sees the whole face of the country cut up and intersected by a multitude of wide, crooked, and useless fences; the small irregularly shaped field, gives the appearance of an ill-contrived patchwork. But it is not alone the awkward appearance of these fields and fences; if there was nothing but the appearance objectionable, that might be overlooked, but there is also a positive and serious loss sustained—*there is a great waste of land*. The English, or any scientific farmer, has his two hundred acre farm, say in eight or ten fields, bounded by the same number of fences, straight, and of moderate dimensions. Two hundred acres of the small farms of Ireland will be divided into from eighty to one hundred fields, with a corresponding number of fences, crooked, wide, and occupying an unnecessary quantity of the land, not to speak of the numerous house steadings, roads, &c., which will be found generally in this country. Now here is a serious consideration, and a powerful argument to wield, by landlords, agents, and others, who advocate the large in preference to the small farm system; and we may safely say, that there is a loss sustained by the small farmer of at least ten per cent., giving the large farm this immense advantage over the small. But the large farms in Ireland, and even the pasture lands, are in somewhat the same state; they are generally intersected with these numerous wide fences. An Irishman can never be convinced that the loss of time is loss of money; in the same manner he never supposes that the loss of land in this manner, is the loss of money. We shall begin therefore numerically, and call this the first error.



## CHAPTER VII.

**THE FIRST ERROR.—SUFFERING NUMEROUS, USELESS, AND CROOKED GRIPES AND DITCHES, TO ENCUMBER AND OCCUPY THE LAND.**

A very important question arises here, Is there no substantial remedy for this evil, this disadvantage under which the small farmer labours? Or can there be no mode of management adopted, by which he will be placed in a better position, and more on a par with the the extensive farmer? by which he may cultivate more of his land, and suffer less to lie waste? or must the remedy of this evil be the consolidation of farms, and of course, the ejecting and turning out the smaller tenantry? We all know the consequences of this course, and what must be the results if it have to be resorted to, or persevered in; therefore, it behoves the small farmer to look forward, be anxious and willing to adopt any plan that may remove this argument and prejudice against him, and avert the evils which might otherwise arise; besides placing him in a more advantageous and profitable position. The answer we give to the question is, there is an obvious and effectual remedy for this evil and disadvantage, and it may be easily applied, simply, *let him level his ditches and fill up his old gripes*, convert them into profitable land. If his farm is small, he does not require ditches and fences, particularly if he house-feed his cattle, (as he ought to do;) if he require fences, let him plant ground hedges, and in a proper position, which he can easily do when the old obstructions are out of his way—even the mearing fences ought to be remodelled, contracted, and straightened. Landlords ought always to straighten mearing fences, and remodel farms out of lease, or at the end of the tenure; tenants could have no reasonable objection to this. If there was a clean sweep, a thorough levelling of all the old ditches, and in their stead were to spring up a system

of neat, straight, well kept ground hedges; besides the immense gain of land, the whole appearance of the country would be beautiful, particularly where the small farms prevail: it would then be a regular system of *large gardens*. This is no Utopian scheme, no very difficult matter to accomplish, if people would only use proper exertion and industry. It has been done in Belgium, and different other parts of the world, and why not do it here? \* There are plenty of hands; we boast of our talents, our strength, our endurance, and hardihood; why do these, with our fine fertile soil, lie half dormant? Why, with such means in our power, are we miserable, poor, and unhappy? The why is plain as way to parish church. We are careless and indolent. It is the bad management, ignorance, and carelessness of the small farmers of this country, that have got them into such bad odour with their landlords and others, and made them a bye word. A skilful, industrious man, on a small farm, will be as able to pay a fair rent, and live in comfort, as any man; he has in general the labour free within himself and family. If he has understanding, he can carry out the minutiae of culture by the spade (the best of all implements); he may, by such means, bring his land to the highest point of production. In this respect he has decidedly the advantage of the extensive farmer; he has it in his power to accomplish exactly what is required, *to turn his small farm into a large garden*, to carry out the system and practice of the garden on his farm. The extensive farmer will be scarcely able to do this, so that all matters considered, it is a very nice point to determine, either in a general or particular point of view, whether the small or large farms are the best, or which ought the more to be encouraged. There are decided advantages on both sides, but skill and industry will cause either to preponderate. The small farm, well managed, is much better than the large one badly. In the present state of agricultural knowledge, there are

\* This course is being followed in different parts of this country, and with the best effects, particularly on the estates of Lord Gosford, under the auspices of Wm. Blacker, esq.

*more farmers that have too much land, than those who have too little.* The want of capital is erroneously supposed to be the main cause of the poverty of the Irish farmer; it is his chief *excuse*, but it is more the want of knowledge and perseverance. Capital, without knowledge, will fail, but skill and knowledge will create capital.

Besides the loss of land, there are many disadvantages attending those useless gripes; they are, in general, so many tanks, holding stagnant water. Nature never intended water to be at rest, therefore it is pernicious where it is so. In general, they are choked up, or partially filled with earth, and when this is the case, the water will percolate, or find its way through the most retentive soil, generally between the surface and subsoil, and burst out at a lower level. This is a great cause of the wetness of some farms, and the draining, sewerage, and filling up such gripes, would go far to dry the land—they would at least, if properly made, be main drains.

The banks of the gripes and ditches are also a regular nursery for weeds. When such is the case the farmer will in vain attempt to keep his land clean; he has from his ditches, an annual supply of seeds and roots. They are also a harbour for rats, mice, sparrows, and other vermin. When they abound in old trees, thorns, and brambles, the roots extending into the fields are annoying for labour, and exhaust the soil; the branches and leaves, also, exclude the light and air, and injure the crops below them. For many reasons, therefore, all such should be cleared away and got rid of. It may be necessary to point out the best mode of disposing of the useless gripes and ditches, of filling up and levelling them.

The first operation is to commence with the hook. Cut and clean out all the weeds, bramble, and branches off each brow and the face of the bank, throwing it out for manure, fuel, or for the purpose of covering the stones in the sewer, when made. Commence then with the spade and shovel and throw out all the rich soil, which will be distinguished by its dark colour and fœtid smell; this forms most excellent manure, particu-

larly when mixed with lime or fresh fermenting dung, and is the kind of manure so highly prized by the Greeks—*earth that had lain under water*; it is excellent for potatoes, and almost any other crop; it is a combination of mould and vegetable matter, decayed and decaying, enriched by the fertilizing properties of the water itself. This is the only advantage the old gripes afford. The next thing to observe, what is the state of the bottom after this has all been thrown out? is it sufficiently narrow and even to form a proper drain? if it is not it must be made so—from three to four inches wide at bottom, with a sufficient declivity to give the water a free and rather quick passage; there must be no hollows or recesses in this or any other drain where the water can settle. The depth of the drain depends on the quantity of stones at hand; it often occurs that the old ditch contains abundance for the purpose, which can be got out as the levelling proceeds, or it may be a very convenient place for burying stones where they are abundant and troublesome. Great care must be taken in filling this drain that no earth or mud remain at the bottom or passes down among the stones; such would accumulate and stop the water. Again, no large stones should be put in any part of a drain, particularly the bottom; they should all be broken to pass through a ring two inches in diameter. If they can be had of a thin or slaty description, let them be placed on end in the bottom, quite close together, and covered again with the small round description, to any convenient depth, from twelve inches up. If there be abundance of stones, let them be put in, always observing to leave eighteen or twenty inches of earth above them, and immediately cover with the brushwood or bramble, or a tough sod taken from the brow and placed with the green side down; the ditch or bank may then be levelled in and trodden hard down. It always occurs that the bottom of an old bank or ditch will remain infertile for a number of years if merely ploughed and cultivated as the rest of the field. This comparative barrenness arises from its long seclusion from the heat of the sun, light, and other atmos-

pheric influences; it will, therefore, be necessary to trench and loosen the ground eighteen or twenty inches deep, to allow air, heat, &c., to pass down and ameliorate it, when in a short time it will become the most productive part of the field. There is no portion of the farm more favourable to the growth of early potatoes than the site of an old gripe and ditch; the first year's crop, if judiciously planted, will generally pay all the expenses attending the levelling, &c.

The next point to be considered is, What kind of fences ought to be chosen in their stead? The outside or mearings require to be very efficient and substantial, in order that neighbours may live in peace; but if house-feeding be generally adopted, trespass will be of rare occurrence. On a very small farm the mearing fences are all that are required. The inside divisions may be laid off by walks to pass between the fields, merely for a wheelbarrow, hand-cart, or in the centre for a car to pass; these may be gravelled or not, according to taste, and if left in grass may be turned to good advantage for feeding during the summer.\* On larger farms inside fences are indispensable, even for shelter, and the ground hedge or white-thorn, or thorn with privet, is superior to all others; it is hardy, lasting, easily trained and kept in order. The beech will also form a handsome shelter; and even the common alder will grow where neither of the others will thrive—in bog, mountain, or on the sea coast, and can be clipped and trained like the others; it grows with great rapidity, and soon forms a shelter for more delicate plants. The furze is a common fence in several parts of the country; if properly looked after it forms a very pretty and efficient one; however it is in general spoiled and neglected; being an evergreen, it is a fine shelter in winter, but, like broom, makes a very indifferent ground hedge. It is usually sown or planted on the top or face of the ditch, and in such a situation thrives well.

\* There ought to be one main or centre road through every farm, large or small, and every field skirting it, so that in no case it be necessary to pass through one field into another. The refuse stones of a farm will in general make and keep it in repair.

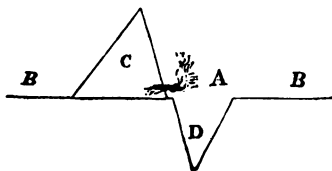
If clipped and dressed annually, it forms a handsome and almost impenetrable fence; but when suffered to grow wild it becomes tall, irregular, and top-heavy; the wind pressing against the tops shakes the stems and roots, and tumbles down the ditch. An old whin or furze hedge, if set on fire on a frosty night, will burn with great rapidity; the stems will rot, and can be used for firewood, and in spring the roots will send forth a most luxuriant crop of young shoots, which, if carefully cropped and trained, will form a new and still better fence; thus a furze hedge may be renewed through generations. At the same time the croppings of the shoots, when bruised and mixed with chaff, are an excellent food for horses and cattle. Gorse is now being cultivated in fields and cut for that purpose.

The next efficient fence is the ditch or stone wall. This is very common in parts of the country, particularly in Connaught. In Galway the best specimens of stone walls are to be seen perhaps in any part of Ireland, or even Europe, and would be essentially serviceable if of sufficient dimensions to stop the fox hunters. When in Galway we were particularly struck with their firm and neat appearance, and with the rapidity and cheap rate at which the people can build them. But on further information, and recollecting that from Athlone to Oranmore we had scarcely seen a gate upon a field, except in the neighbourhood of towns and villages, and few even there, the horses and cattle are therefore confined by stone gaps, and as some of the cattle must necessarily be brought out and returned at least twice in the day, and as the gaps have as often to be tumbled down and rebuilt, we will not wonder that the people are so expert at ditch building; their extensive practice from infancy renders them so: a little time consumed in such operations is never taken into account in the far west. These stone walls, however, though a good fence and shelter, impart a disagreeable appearance to the face of the country. They are not permanent; they are exceedingly difficult to keep in repair when they get old.

As the white-thorn hedge is to be preferred to all others, we shall point out the best mode of planting

and managing them afterwards. All plants, of whatever kind, if they are intended to thrive quickly and make a good fence, must have rich, clean, and deep ground. To plant a hedge merely on the surface soil, no matter how rich it may be, is laying the foundation of a dwarf, stunted fence; the same may be said of planting forest trees. All ground for trees and hedges ought to be well trenched and deepened before planting. On trenched ground the trees will grow as much in one year as in three in the surface soil. When planted in the usual way the small roots and fibres are at once placed in a disadvantageous position, in contact with the cold, hard, and sterile subsoil. The site of the hedge, therefore, ought to be deeply trenched, the surface soil thrown down where the roots are to be placed, and the subsoil turned up. If it should happen that the field or fields through which the new hedge has to run, have been in green fallow crops and manured, so much the better; but even so, it will be well to trench down a quantity of dung or compost where the plants are to root themselves. The deeper and richer the ground when planted, the sooner the plants will become a thriving and pretty fence. The line of the hedge should be laid off and trenched from three to four feet wide, taking care to pick out all couch-grass, or other roots of weeds; when this is done the planting may commence. A line must be stretched along the course of the hedge in the centre of the trenched part, and a deep bed made for the roots of the plants. They are to be placed in a space made for them, from ten to twelve inches asunder; and if thought proper, a plant of privet between every two thorns. They must be placed in a vertical position, taking special care not to double the roots, and allowing for the sinking of the earth, which will always take place, the earth returned to cover the roots, and afterwards tramped down to give them a firm hold of the ground. The planting may be done any time from November till the end of February. Beech or other kinds of plants are to be done in the same manner, but placed further asunder. The best age for thorn quicks to be planted out of the seedling bed, is three years. It is rare that

two years old plants are sufficiently strong and hardy, and one year old is entirely out of the question, though many persons will plant the younger kinds to save a few pence, but they will have cause to regret such economy. If they have been attended to, kept clean, and the earth occasionally stirred about them, at the end of two years from the time of planting, they will be found strong and tall, and this is the time to *head them down*; heading down is for the purpose of thickening the hedge, producing numerous and lateral shoots. A hedge not cut down will grow tall and thin, and will neither be a good fence nor shelter—this operation is, therefore, indispensable. It is very simple; merely take a knife, or sharp hook, place the feet on the earth over the roots, to prevent their being displaced, and at the height of three or four inches from the ground cut off the top, and afterwards clean and dig about them. This ought to be done in the autumn, September or October, and in the following spring every root will send off a numerous offspring, spreading in all directions, and will then require to be neatly trained and brought into shape—that shape always conical, the base the bottom of the hedge. The old method of trimming or clipping hedges was just the opposite, flat upon the top and narrow at the bottom, from which the light and air were excluded. Such hedges became thin and light at the bottom, and allowed animals, such as sheep and pigs, to pass through. Thorn hedges, like furze, may be renewed, and will last for centuries. Whenever a hedge gets too tall, thin below, and has the appearance of old age, it ought to be cut down as before, and a young and vigorous one will rise in its place. The most common mode of planting and rearing thorn fences, has been to make a bank and gripe, planting the thorns in the face of the ditch, and in a horizontal position, thus:—



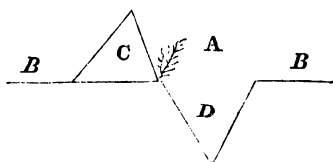


A, the plant; B B, the ground level; c, the ditch; D, the gripe.

On consideration, the principle will be found wrong, for the roots spread in a horizontal direction, across the ditch, and when they reach the outside, their food is gone, the tops become stunted. Again, the ditch, like the roof of a house, throws off the water to each side, and the roots of the plants lie quite dry, deprived of the natural moisture. If at any time it be found necessary to take the back off the ditch, or a part of it, this cannot be done without injuring the roots and tender fibres, which spoils the hedge.

A better mode to make such a fence, is to trench and manure the line of the hedge, the same as for the ground hedge, but only about eighteen or twenty inches wide; then plant the thorns in this in the same manner, only giving them an inclination outwards, towards the intended gripe, of about  $45^{\circ}$ , afterwards open the gripe parallel with the thorns, and about six inches from them, and build the ditch behind.

The fence will appear thus:—



B B, the line of the ground in which the hedge is planted; A, the thorus; c, the ditch; and D, the gripe.

The advantages of this mode are obvious; the roots of the plants being in the ground, and not in the ditch, spread with freedom, and the plants thrive better; they find the water percolating through the soil. The ditch may at any time be taken away without injury to the hedge, but rather the contrary.

We have chiefly confined our observations to a description of the thorn fence, and the mode of planting and managing it; but as a variety of other kinds are in use, full details respecting them will be found in agricultural books and periodicals, to which we refer for further information.

## CHAPTER VIII.

THE SECOND ERROR.—THE NOT SUFFICIENTLY DRAINING  
AND DRYING THE LAND.

Almost all our lands require draining, more or less, for reasons that shall be pointed out. Our climate is naturally damp, therefore our lands should be artificially dried to correct this disadvantage. We live on the verge of the great Atlantic Ocean, from which an immensity of vapour is continually ascending, and this being wafted to us by westerly winds, which prevail the greater portion of the year. Our bogs, swamps, mountains, and even underdrained cultivated land, holding water like a great sponge; from which evaporation is also constantly going on, cooling the surface, and the atmosphere above it. The ocean vapours passing over come in contact with the vapours from the earth and the cold, are condensed, and precipitated upon us as fogs, torrents of rain, hail, or snow; which again perpetuate the cold and damp, and produce discomfort and disease among the people—fevers, colds, consumptions, and other ailments; not to speak of cold, wet springs, late harvests, blighted and rotted crops, with numerous other misfortunes. Not only, therefore, in an individual, but in a national point of view, every cultivator of the soil in Ireland is called upon to drain and dry his land.

If the whole surface of the country, our mountains, bogs, and other lands, were dry and cultivated, an entire change would be produced in our climate. If the water that falls in rain, instead of lying on the surface evaporating, and cooling the land, were quietly wending its way under ground, through the drains to the rivulets, streams, and rivers, and eventually to the ocean; much less rain would then fall, the surface of the ground being dry, would also be warm; this warmth would keep the ocean vapours elastic until the winds would

waft them over us to some colder climate, and a less favoured country. General drainage then would give us not only a warmer, but a drier climate, with all its advantages.

These are not speculative or wild theories—they are facts founded upon the experience and history of ages; it will be found that the improvement of any country by superior cultivation has produced as happy a change in the climate as in the soil. What deplorable accounts do the ancient Roman historians give us of the climate and soil of Germany in the days of the Republic, and even of the early empire; when the Roman armies were compelled to cross the Rhine, in order to chastise the then barbarous inhabitants, though victorious, they returned dispirited, diseased, and disgusted with every thing they had seen. No wars were so unpopular in Rome, with general or soldiers, as a German war. Besides the savage and barbarous state of the inhabitants, they represented the soil and climate as wretched in the extreme; the face of the country covered with forests, lakes, and marshes, where the sun's rays seldom penetrated to the earth; and a series of frost and snow, rain and fogs, prevailing and succeeding each other through the seasons, engendering pestilence and famine; and we have no reason to doubt the correctness of this picture, though the present appearance of Germany would seem to belie all these representations—but we see what almost incredible changes have been produced by civilization and cultivation. The forests have been cleared, and the sun's rays have reached and warmed the earth; the marshes and lakes have been drained, canals and water-courses have been cut, and the rivers confined to their proper channels. The various crops cultivated by the Romans, in the superior soil and fine climate of Italy, can now be raised with complete success in Germany. All this extraordinary change in soil and climate has been produced by art and industry, but chiefly by drainage.

We may adduce a modern instance on a large scale; we shall take the North American States. Such was the insalubrious and unfavourable state of the climate,

some seventy or eighty years ago, that it was in this country called the grave of Europeans. A long and severe winter, with alternate rain, frost, and snow, in spring and autumn, produced agues, fevers, and other fatal complaints. The same causes produced the same effects in the Western world, as in Europe—extensive forests, with undrained lakes and marshes. But a great tide of emigration having set in from Europe, young and old, persons of all ranks and classes in life, leave their former country, and settle down there with impunity—except in a few of the Southern States, which have not been improved—and we now hear not a word of extraordinary disease or premature deaths. There an influx of hardy, industrious, and skilful people, aided by the former settlers, has entirely changed the climate and face of the country; even to a certain extent, the seasons. Canals have been cut, marshes and lakes drained, forests cleared away, and cultivated crops reared in their stead; all these changes have been produced by human labour, skill, and industry, and, in a great measure, by drainage. An example, on a small scale, is nearer home. What are the people of Scotland doing on a poor, thin, cold, wet, soil, by drainage? They are turning their moorlands into well cultivated, valuable farms, and rich pastures; and along with the improvement of the soil, they also improve the climate.

From generalizing we must come to particulars, and point out what drainage, and the neglect of it will produce on a single farm; a farm is a country in miniature.

We have stated what evaporation will do on a large scale, and the same thing occurs on a smaller on a farm. If it be retentive and undrained, and there is no mode by which the excessive water can percolate through the soil, it will remain on the surface, and in the vegetable mould until it be evaporated. It will inflict much injury on the land in various ways, while it does lie, and it requires the heat necessary for the vegetation and growth of plants, for the preparation of the food, and a variety of other purposes, to evaporate it. Nature supplies this heat daily by the sun, but the excessive

wet in the soil having no inclination to remain there, having a disposition to return again to the atmosphere, and having no power to raise itself, it absorbs the heat which it carries off to the air, leaving the land, the crops, and the manure, idle, and cold, and powerless. Like the fingers on a frosty morning, all the great operations of nature are paralysed and at a stand, so long as any water remains to carry off the heat. From this we have no difficulty in understanding that wet land is always cold land, and late land, and poor land, producing bad crops; and that dry land is always warm land, early land, and rich land, producing good crops. We shall endeavour to illustrate this still further by a very familiar example. We exercise, travel, or work in the open air, on a very cold dry day, yet we do not feel uncomfortable; and when we go into the house we feel quite warm and comfortable without sitting by the fire. We go out upon a rainy day, though it is not cold, and we get our clothes wetted, and we go into the house and sit down, without changing those wet clothes. We do not feel comfortable; we become cold, though not far from the fire, and by and bye will have cough, and headache, and sore throat, and pains in our joints and limbs. Now it was the water did all this upon us, the wet clothes that deranged all the machinery of the body. The water was not satisfied to remain in our clothes, it had its strong disposition to get into the air again, and it stole away the heat from the skin, from the surface of the body, to accomplish its purpose; and, like the surface of the field, it left the body cold, and the perspiratory pores closed up, and the machinery went astray, all in consequence of the evaporation of the water that carried away the necessary heat from the body. This will explain the reason why we ought to drain and take the excessive water from our land.

Nature carries forward her operations by means of great agents or assistants. The principal of these are heat, light, air, and water. These are in constant and active operation, and in every part, in the air, in the earth, and on the earth. The earth is the great laboratory, or workshop, in which these agents act; they are

continually carrying on a most extensive system of natural chemistry, producing the most important changes. The chemist in his laboratory is humbly imitating nature; there is nothing at rest; all is in motion more or less. Now, in order to the correct working of this great system of machinery, there must be a perfect adaptation of the parts, of the materials, and of the motive power; the great agents must be in what chemists call equivalents, or regular quantities; there must be a correct combination, a happy mixture of all; otherwise the operations are impeded, the working of the machinery is imperfect. An excess of any is pernicious; an excess of heat will burn; an excess of water will drown; and an excess of air or of light is hurtful. On the other hand, a deficiency produces the same effects, and it is the province and the duty of man, particularly that class who cultivate the soil, to assist nature in her operations, to keep this great machinery in perfect working order. By this great system the soil is prepared, changed, and ameliorated; the vegetable and animal kingdoms are produced and supported; in the earth and in the air the food of plants is elaborated and formed; and this food is the products of a former race of plants and animals with certain inorganic ingredients of the soil; but manure which is decaying, plants, and animal substances, must undergo many chemical changes, and new substances must be formed from it, before the living plant can appropriate it for food. The greater portion of these changes ought to take place in the soil. Manure is mixed with the earth; it decays, decomposes; new combinations are formed, liquids, and gasses; and in this liquid and gaseous state the plants absorb and live upon it. But in order to the full development of this principle, the soil must be in a favourable state, and the natural agents present, but not in excess. It must not contain too much water; it must not be too hot, nor too dry, and it must not be too cold. Heat, air, and moisture, are necessary to produce chemical changes; and if any of these are absent or in excess, the manure will not decompose and form the necessary food for the plants. Undrained wet land, therefore, is

not in this favourable state; it contains an excess of moisture, and consequently of cold, two conditions which arrest decomposition. Manure applied to wet cold land does not decompose and form the food for the crops; it remains in an inert, morbid, unnatural state; it is in the state of peat in the bog. Peat is vegetable matter in an undecomposed state. It remains so, because there is an excess of moisture and of cold around it; but remove it from the bog and dry it, that is, remove the superfluous moisture and cold, and it will immediately decompose, particularly if it be mixed with fresh fermenting dung or lime, where it may obtain the necessary heat and conditions for a chemical change; and the same occurs with manure in wet undrained land; it is wholly or partially useless.

Lime has been used as a manure during a long period, and with great advantage; the Romans knew the value of it. There have disputes arisen as to whether it is really a manure, or merely a stimulant, forming manure in the soil. The progress of chemical science, however, has settled that point. There is no question that *quick lime*, when mixed with the soil, not alone combines with the inert vegetable matter, and renders it soluble (the food of plants), but also combines with acids (forming salts), which are a part of the inorganic food. At the same time, it neutralizes the acids, which in a free state are unfavourable to vegetation. But lime will be of very little service, at least for a long time, to wet, undrained land. It has a great affinity or attraction for water, which it immediately seizes upon wherever it can find it, in the air, or in the earth, and saturates itself, forming what is called hydrate of lime. But this hydrate of lime will not act on the inert vegetable matter in the same manner as the quick lime; hence its inefficacy in wet, undrained land. The excess of water combines with the quick lime, and renders it comparatively useless. There is nothing more common than to hear farmers complain of the inefficiency of lime applied to their land. This is all true; but in most cases it is the want of drainage which renders it of so little effect.

We have before observed, in regard to manure, that

there are a variety of chemical changes going forward in the soil besides the decomposition of dung, and the formation of the *organic* food of plants. The inorganic or mineral food is continually forming also, by similar processes, and requiring the same conditions—heat, air, and moisture; but an excess of water in the soil excludes air and heat, stops these necessary changes, and the plants are deprived of their inorganic food. The use of drains, therefore, in the soil, is not merely to carry off water, but to admit air and heat to the soil and sub-soil; they are *ventilators* as well as *aqueducts*.

In regard to labour, which is a most important subject with the farmer, the quantity and quality greatly depend upon the state of the drainage. If the land is of a heavy clay description, and undrained, the labour will be severe both on man and horse, and of course expensive; but if dry, even the most tenacious soils will be comparatively easy, and cheaply done. Besides, wet land can only be laboured at certain times and seasons—always late. Late ploughing causes late seed time, and late harvest, which seldom turns out well. The early crop is always the safest and most productive. Besides, the ground is never in a proper condition to receive the seed; it is either too wet or too dry. If sowed when wet, a scurf will form on the surface in dry weather, exclude the air, and injure the crop. If sowed when too dry, it is then of the consistence of brick, and no extra labour will break it down to a fine state of tilth, to cover the seed properly; and the same consequences follow—the dry spring will injure the crop. But the most retentive soil, when properly drained, can be ploughed at any season (early of course); the winter's frost will act on and ameliorate it in various ways. The first indication of spring will find it ready for the seed, loose, friable, and easily managed; much less seed will suffice, the seed will get a favourable bed, and a loose fine cover. Such advantages must produce an early and abundant crop; not to speak of a dry warm soil in winter for the autumn sowed crops, and the difference of preparing wet and dry land for potatoes and other green crops in the early spring and summer.



The roots of the natural grasses and the common cultivated plants are chilled and injured, summer or winter, when an excess of water sits about them, and in dry seasons wet land cracks, and great and numerous fissures are produced, which seriously injure the roots of the crops.

Common observation will enable us to see that on the face of the earth, on all land, no matter what is its condition, there are growing two classes or descriptions of plants, altogether different from each other,—the one kind upon bogs, morasses, mountains, or wet lands; the other upon well-drained, dry, warm, cultivated lands. The former we call *aquatic* plants, from their disposition to grow or to be produced among water; the other class we call the *natural* plants, from their habits of growing on land in its proper or natural state—dry and warm. Though we often find these two classes growing together on the same field, they have no disposition to do so, for they are altogether distinct in their habits and properties. When an animal is turned into such field it will confine itself exclusively to the natural plants, and nothing but hunger will force it to eat the aquatic—rushes, sprit, heath, moss, and various kinds of water grasses. It is true that in several parts of the world whole districts of country are lying wet and under these unnatural plants, and that sheep, cattle, horses, and other animals are reared and fed upon them; but all such cattle exhibit the character of the soil and country upon which they are reared and fed. They are small, stunted, and very inferior in every respect to the same class of animals reared upon the dry, warm, rich pastures and natural grasses. The latter superior and valuable breeds will also deteriorate, become diseased, and of comparatively little value if removed to such unfavourable situations—cold, undrained land, and bad herbage. From this cause our most valuable breeds—short horned cattle, South Down and Leicester sheep—have not succeeded at all in such situations. An immense annual loss is sustained by farmers and graziers in different parts of the United Kingdom from rot and other diseases, particularly among their sheep, in conse-

quence of wet land. Again, if we remove the small, hardy, stunted animals from their unfavourable position into warm, dry, luxuriant pastures, the consequence is, a most extraordinary change; they will thrive and fatten with the greatest rapidity, and become valuable in a very short time. The West Highland, Galloway, and Kerry breeds of cattle, and the Black-faced, Cheviot, and other breeds of sheep are instances of this. Much controversy has arisen among agriculturists as to the merits of the several breeds of these animals, and their suitability to certain localities. We believe great errors prevail on such subjects. The approximation of opinion among these people seems to be, that the animal should be chosen to suit soil and situation; whereas we believe that the soil ought to be brought into a condition to suit the *animal of every class and denomination*.

It is not merely on account of increasing the quantity and quality of grain and other cultivated crops that we would impress upon the farmer the necessity of drainage, but, at the same time, that he may increase immensely the quantity and quality of his pasture, grasses, and other forage, whereby an increased number and a better description of animals of the farm may be kept in the best possible condition.

When we see a field, a farm, or district of country producing rushes and other aquatic plants, we generally suppose that it is some peculiarity in the soil, some disposition in the land to produce them; but we are altogether in error; there is no such thing as a disposition in any land to produce such plants; it is because the land is in an *unnatural state* that it does so; it is filled or saturated with water, and it produces those water plants. Drain such land; draw off the superfluous moisture; remove the consequent cold, and all these aquatic plants will disappear: they have lost their subsistence and can no longer live. But nature is never idle; she will supply their place by a different race, a better description, suited to the tastes and wants of the animal creation. ...

We might point out numerous other reasons why we should drain our land; but as we wish to be brief in our observations, and having alluded to some of the

prominent disadvantages attending wet land, we shall go on and point out the general causes of wetness.

In order to perfectly understand the science of draining, it is necessary to know something of geology, the science that points out and explains the nature of the crust of the earth, the materials of which it is composed, their consistency or cohesive qualities, and the positions in which the different layers or strata lie. It is not our object here to enter into or dwell upon abstract science; we merely avail ourselves of science, to explain or illustrate correct practice, and point out where experience and practice confirm and prove correct theory.

Geologists tell us, and common observation supports the assertion, that the crust of the earth, so far as man has been able to penetrate, is not one solid uniform mass of any particular substance, but a series of different substances; different in texture, in composition, and in quantity; lying in concentric layers or strata, arranged in groups, and in a determinate order; the inclination horizontal or nearly so, unless where the regular strata has been disturbed and thrown up in various forms, heights, and at different angles to the horizon. The disturbing cause being fire or volcanic action, which, besides disarranging the regular strata, sent forth masses of melted lava, which, when cooled, produced with the disturbed strata mountains and hills and all those immense heaps of rocks which are called unstratified. Although there are an almost endless variety in the series of strata, the materials or elements of which they are composed are by no means so numerous; and a simple classification will embrace them all. They are rocks of various kinds and textures, clay, gravel sands, marl, chalk, coal, salt, &c., interspersed or mixed with the petrified remains of plants and animals called fossils; flints, metallic substances, combustibles, and in the coal organic matter. But so far as drainage is concerned, or the passage of water, the classification is still more simple. There are two classes, *pervious* and *impervious*.

The first—sand, gravel, or chalk—which will allow the water to pass through; the second class—clay and rock—which will retain or resist the passage of the

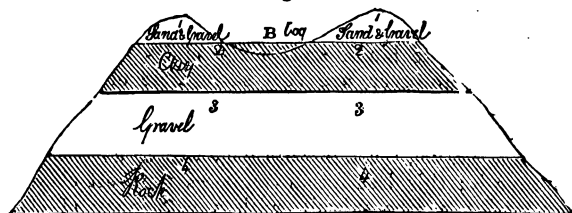
water; and these are the substances that approach or show themselves at, or near the surface of the earth, and of which the vegetable mould is chiefly composed. It is principally owing to the stratification of the soil and subsoil, particularly the latter, that land is found wet or dry. If the surface soil be of a heavy or clayey and retentive character, and the subsoil the same, such land will always be wet, unless it be drained, trenched, and cultivated. The rain that falls rests upon it and in it, particularly if it be waste or in pasture, beaten down and consolidated. Again, if the subsoil be tenacious and heavy, and the surface soil light, such as sand, gravel, or peat, or a mixture of these, this land will also be profitless and wet, unless well drained, subsoiled, and a portion of the subsoil brought up and mixed with the upper. This is the particular condition and cause of the wetness and formation of peat in our bogs, mountains, and waste lands, and of the muirs in Scotland; such lands, however, are very susceptible of improvement. If the surface soil be retentive—clayey, and the subsoil (even at a considerable depth) be light, porous, sand and gravel, much less drainage will be sufficient to improve it; this description composes the best class of our lands; a free subsoil, with a sufficiency of clay above to render them substantial; they are warm and kindly. When both subsoil and surface are pervious, they require no draining, but are in general the most worthless of our lands.

There are two chief causes which produce the excessive wetness in land. First, water which falls from the clouds upon heavy, flat, retentive soils, and cannot make its way through the subsoil—this is called surface water; and secondly, water which rises from below, in consequence of its meeting with some obstruction in its passage downwards; producing what is called land springs and main springs. In the latter case the wetness is not so generally diffused over the surface as the former, but appears, or shows itself at different points in the same field, generally across the declivity, according to the stratification below. This was formerly considered the only case that required drainage, but

later experience has shown that a great deal more land is wetted from surface water than that by under water, or springs. We have before explained how surface water is retained and held up in the soil; we shall now endeavour to point out how the under water is forced up, producing the land and main springs.

All wetness depends on the stratification and nature of the subsoil. In irregular or hilly ground many layers or strata may lie between the top and bottom of a hill, mountain, or district of country; and when that is the case, the face or surface will exhibit different states of wet and dry, according to what lies under it. We shall refer to the following diagram, in order to make the case more plain.

Fig. 1.

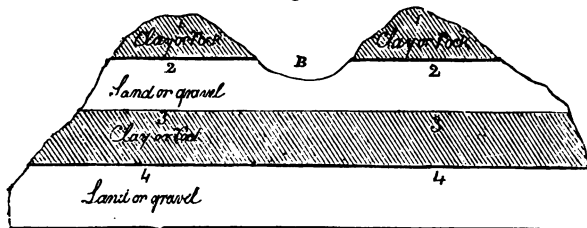


Figure, No. 1, represents a section of a field, hill, mountain, or country, and the figures 1, 2, 3, 4, show the different internal layers or strata; and it will be perceived that it is composed of alternate pervious and impervious substances, viz., 1. gravel; 2. clay; 3. gravel, or sand; 4. rock; the outside surface accordingly exhibits dry or wet land. When rain falls upon No. 1, the top of the hill, the substratum of which is sand and gravel, it remains dry, for the water passes down freely; but when it comes to No. 2, it is stopped by an impervious stratum of clay, which will not let it pass, but, being pressed upon by the water above, still sinking through the gravel, it is forced out to the surface, and runs down the declivity from No. 2 to No. 3, wetting all the land, and producing rushes and other aquatic plants, until it comes to No. 3, another pervious stratum of gravel, which readily absorbs it; and it now takes

an internal course, and leaves the surface of No. 3 dry, when it again meets with an obstruction in a stratum of rock, No. 4, at the base of the hill, and is again forced over the surface, producing wet land, bog, muir, or the like; and, therefore, Nos. 2 and 4 must be drained, to make them dry and productive, like Nos. 1 and 3. Between the small hills, marked No. 1, is a hollow, the bottom of which is impervious, being situated in clay, No. 2; this holds the water which passes from each side of the gravel hill, on the right and left, and, if there is no river or outlet by which it can get away, it forms at B a lake, a bog, or a morass. It was in such situations that the celebrated Elkington distinguished himself; he would have introduced his auger in the bottom of the lake or bog, bored through No. 2, and let the water down into No. 3, the absorbent stratum, and dried the bog.

In order to illustrate this case still farther, and render it more easily understood, we shall reverse the situation of the dry and wet ground in the following diagram.

Fig. 2.



In this figure—No. 1, the top of the hill, is impervious rock or clay, but, of course, injured by surface water which runs down the slopes on each side, until it meets No. 2, a porous stratum, where it is absorbed, and takes an inward course until it is again stopped by clay or rock, at No. 3, leaving the surface of No. 2 dry; it is forced out again, and runs over No. 3 on all sides, until it comes to No. 4, where it is absorbed and lost sight of. This holds good with the rain that falls on

every portion of the hill, as well as what percolates from the top.

Now, in this instance, if the different parts are not drained, the top of the hill will be cold, producing heath, peat, and other aquatic plants. No. 2 again will be dry and kindly, but No. 3 will be wet, with its accompaniments; and No. 4, at the base of the hill, will be fine, warm, dry, deep land, partly alluvial, from the constant washing down of the debris from the upper grounds.

The valley between the two hills at B, which in the other case was bog, lake, or morass, is here dry, warm, and fertile. From this it will be perceived, how much the quality and value of land, in its improved state, depends upon its substrata, or geological formation.

It may be necessary to remark, that the surface soil of land lying immediately upon rock, is not always cold and wet; the contrary is the case in many instances. It is only where the rock is lying horizontal, or nearly so, closely imbedded, and of adhesive texture, that it is impervious; but when it has been partially or wholly upraised, shattered and full of cracks or opens, it is particularly absorbent. The sandstone formations in this country are absorbent, and the soil on such rocks, though thin, is very kindly, affording sweet pasture and fair crops.

It would be an endless task to attempt an explanation of the different ways in which water forces itself to the surface of the earth, in consequence of obstructions and facilities; it would be a vain attempt to explore the internal structure of the earth, to trace the contortions and sinuosities of the strata under every field, farm, and neighbourhood; but as the foregoing explanations and diagrams explain the principle, the details will be more easily comprehended.

We now enter upon the most important part of our subject—the best mode by which the land may be drained, and the superfluous moisture carried off under ground. Until within a very few years, this most necessary permanent improvement of the soil was but imperfectly understood (indeed it is so in many parts of

the country yet); it was seldom resorted to, and when attempted, was executed in a most incorrect, inefficient, and careless manner. The great body of agriculturists had no clear idea or conception, between the value of dry and wet land; in fact, they scarcely knew the difference, or the reason why certain soils were inferior to others, in consequence of a superfluity of moisture; nor had they any notion that by artificial means all the land of the country could be rendered productive, and more on a parity of value. Individuals who became aware of such things, and who attempted to drain their land, were quite ignorant of any correct or permanent mode of doing so; every one had his peculiar manner of executing the different parts of the work, according to his notion or caprice, and, in general, all incorrect, so far as perfect and efficient drainage is concerned. By the old method almost all drains were run in a wrong direction; a fatal error, which rendered the future operations and cost as so much money thrown away. They were in general opened too wide and too shallow, the materials by which they were filled being chiefly stones, were put in, either too many or too few, and in a careless and erroneous manner filled up too near the surface, by which, in the after culture of the land, the plough or spade unsettled the drain, filled it up with earth, and produced a worse state of things than existed before the land was drained at all. Various modes were adopted, both on pasture and tillage land, but nearly all were erroneous and inefficient. Perhaps the best and cheapest mode that was tried, was the plug and sod drain on pasture land; but it is needless to observe, that such could not succeed where cultivation was practised.

Unfortunately for the agricultural world, there was no correct, simple, and efficient mode of executing the drainage of land before them; no recognised system—clear, acknowledged, and easily understood.

Agricultural writers, theorists, have long ago in their books laid down rules, and recommended modes of draining; but such have not been much attended to. Elkington, a farmer of Warwickshire, in England—a



man possessed of more than ordinary skill and intellect—some time about the middle of the last century discovered and practised a system of draining, different from, and superior to anything that had gone before him. It was based upon correct principles, and a knowledge of the geological structure of the earth; but though successful in the hands of a first-rate man, it was too scientific for the generality of farmers to adopt or carry through with success. The peculiarity or principle of the system was, to examine and find out the geological structure of the subsoil under the wet land, to catch the springs at their rise or fountain head, and carry them off by deep drains; or find them out by an auger, which penetrated to great depths. Elkington was eminently successful with his system; he achieved wonders in draining land on an extensive plan, and even at a cheap rate. He astonished the world at the time; but no man since has attained equal eminence, or been at all so successful in carrying it out. He communicated his secret and system to a gentleman, Mr. Johnston, who explained it to the world in an excellently written work, to which we would refer those anxious for further knowledge of the system. In Elkington's system, the chief object was to catch up and carry off the water that rose from below in the form of springs; drainage for the purpose of carrying off surface water was not insisted on.

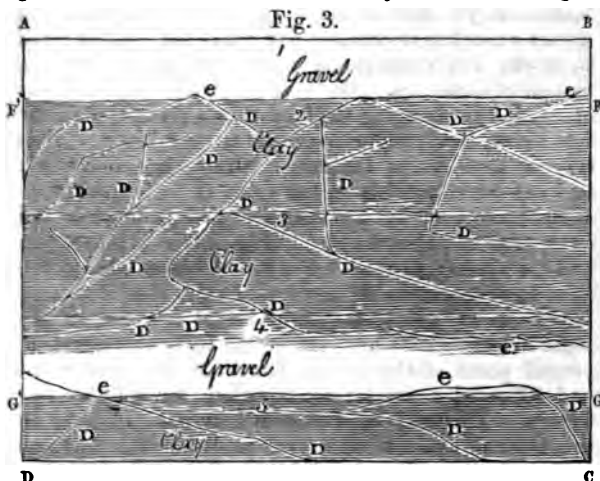
It was reserved for our own times (and only a few years ago), the discovery of a system equally simple, efficient, easily understood and executed,—a system that the most common understanding may easily comprehend, and the most stupid farmer may execute and carry out; a system, the principle of which is suited to all soils, situations, and countries, equally successful in draining off the superfluous surface water, as of picking up and carrying away what rises in the form of springs.

James Smith, of Deanston, near Stirling, in Scotland, is the author and publisher of this system; the importance of which to the world is incalculable, and we may fairly state that he has done much for the benefit of the country and the human race.

This gentleman was not originally a farmer, but in the manufacturing and commercial line; verifying the old adage, "*That no mere farmer was ever the author of an important improvement in agriculture.*" He found it convenient to take a farm in the neighbourhood of his manufactory—land of the very worst description, and almost valueless from excessive wet. He set his mind to work, and commenced a new and most extensive system of drainage. He persevered, and carried it out successfully; changing the land from a cold barren muir into a fine, dry, productive, well cultivated farm. This was well, so far as his own interests were concerned; and had he stopped here, the value of his experiments would have been but a mere trifle, and confined to his immediate neighbourhood. But *he published* his success and his system to the world; which has produced the most important results, given a stimulus to agricultural improvement which was never before felt, and in the right direction. It has been stated that others, and in several parts of the United Kingdom, had discovered and followed a similar mode before Mr. Smith's was known. This may be true, or it may not; we have no proofs for or against. It is very probable that the same ideas may have been entertained by persons at different times and in different parts; but those persons who would claim originality or priority of invention have no merit—they hid their light and the community was not benefited. Mr. Smith, on the contrary, exposed his to the world, for the benefit of mankind; he has clearly, therefore, not alone the merit of originality, but, what is of greater importance to the public, the great merit of rendering his system almost universally beneficial.

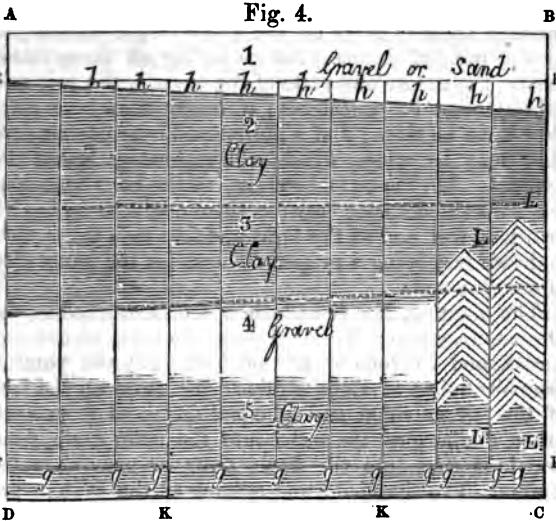
We shall now proceed to explain the Deanston system in as brief a manner as possible. The chief peculiarity of Mr. Smith's method, and wherein it differs from all former modes of draining, is, the direction in which the drains run. The old course, and that adopted by Mr. Elkington, was transverse, across the declivity or slope. By this means it was considered that springs or under water could be more readily taken up, and cut off from

wetting the land below, besides that surface water would readily find its way into such cross drains. They were run in all directions towards the wet spots or springs, and in the most irregular manner. The following diagram will show somewhat the old system of draining.



Let A, B, C, D, be a field or portion of ground which is partially or wholly wetted from both surface and under water, in consequence of its adhesive nature and the stratification of the subsoil. Nos. 1, 2, 3, 4, 5, represent the different strata, and the dark portions show the wet grounds. D, D, D, D, D, D, D, D, show somewhat the course of the drains upon the old system, made by a kind of chance or guess work, running zig-zag from one spring to another, and altogether inefficient for catching either the surface or under water. They were too low or too high to intercept the latter, except at the points e, e, e, e, e, where they cross the junction of the pervious and impervious strata, where the water bursts out, and they are equally inefficient for catching the surface water. But a *main*, well constructed, transverse drain, from F to E, and another from G to C, exactly on the line of junction of the strata, and where the water bursts out,

would cut off all the springs below. This was Elkington's system. He had skill to discover the exact line of strata, ran the drain accordingly, and this was the secret of his success; but there is not a farmer in a thousand could do the same, or, even if they did, the surface water still remained, these drains not being at all capable of taking it up. We shall now refer to diagram No. 4, and show how thoroughly Mr. Smith's system will drain such a field, no matter in what position the under strata lie, or where the water rises.



Let A, B, C, D, be a field in somewhat the same conditions as the one in fig. 3. 1, 2, 3, 4, 5, represents the stratification, and the wet ground is apparent. In order to drain such field, we begin at the under part, and at the distance of nine or twelve feet from the fence D, C, we lay off and open the main drain F, F; then go to the head of the field, and at the same distance from the ditch A, B, we open E, E (in most cases this upper drain may be dispensed with). The under main drain is the principal one, as it receives and conveys the water from

the parallel drains. It may discharge the water at F, F, or at several outlets, as at K, K. We next commence to open the parallel drains, and they must run directly up the fall or face of the hill, and at right angles to the main drain. They are on the diagram g, g, g, g, g; they must be straight and parallel to each other, and commence at the hollow or main drain. This main drain must always be in the *hollow part of the ground or field*, whether that be at *one end, the centre, or other situation*, even if it run diagonal; and if there be more than one, or several hollows. There must be sub-mains running through them to carry off the water that is discharged by the parallel drains. Before laying off these latter drains, the nature and state of the ground, the soil and subsoil must be considered; if heavy tenacious clay, they must be close; if of a lighter and freer description, they may be wider, which will materially lessen the expense. Mr. Smith reckons that on the most tenacious wet soils the distance between them ought to be twelve or fifteen feet, and on the light and free soils thirty feet, eighteen feet being a proper distance for the generality of our clay soils.

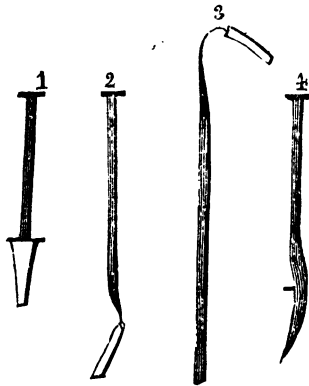
The diagram, No. 4, will show a field drained on the Deanston system; the main drains running transverse, across, and convenient to the ditch, and the parallel drains running at right angles to the main up the face of the fall or slope, and at equal distances from each other, discharging the water into the main drain, from which it runs into the ditch, river, or general water course. The simplicity and efficacy of the system are such, that any farmer or labourer may drain a field by following the directions here given. He can scarcely make a mistake if he open a main drain or drains in the hollow or hollows, and run the parallel drains at regular distances up the declivities. The parallel drains will catch up all the springs and under water, as they cut the strata at right angles, or nearly so, at the points h, h, h, h, see fig. 4, where it issues out. They cannot miss tapping the springs at these points. There are sometimes what we call main springs rising in land, but these may be picked up and carried off by single drains.

In regard to surface water, these drains completely absorb and carry it off also, if placed sufficiently near each other. L, L, fig. 4, will show the course of the surface water from each side into the drains. When made they immediately relieve the earth from the pressure of the water above and below, and a general drying of the soil ensues. Fissures and cracks are formed, which serve to conduct the water into the drains as it falls, particularly after trenching and subsoiling.

In regard to the construction of these drains, and the implements necessary for the purpose, the matter is also plain and simple. The drainer must be provided with a line (as all drains ought to be straight), a common spade and shovel, a pick, and a draining spade and scoop, and in some instances a foot pick. Fig. No. 5, represents these.

Some use two or more kinds of draining spades, and scoops of different sizes; but for ordinary purposes one of each will be sufficient. If the draining spade and

Fig. 5.



No. 1. Draining spade.

No. 2. Draining scoop.

No. 3. Drag scoop.

No. 4. Foot pick.

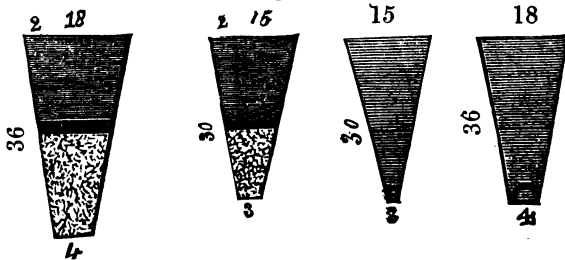
scoop are not conveniently to be had, excellent substitutes may be formed from an old spade and shovel. A

smith with a cold chisel on his anvil can in a few minutes cut off a portion from each side of the old spade, filing and smoothing the edges, leaving the point from two and a half to three inches broad, as seen in fig. 1. In like manner the shovel may be cut and bent semi-circular on the horn of the anvil, and to agree with the breadth of the point of the draining spade. Some kind of drag scoop is necessary to clean out the bottom of the drain before filling in the stones or tiles.

In opening the drains skill and neatness is required. The sides must have a regular slope, be left clean, and the earth at the bottom well cleaned out. All the drains must be regular and level in the bottom, no heights or hollows left to stop or hold the water, and a regular and even fall be preserved. If there be inequality on the surface, they must be cut through, so that the regularity at the bottom be preserved.

The main drains are recommended to be opened eighteen inches wide at top, three to four inches at bottom, and thirty-six inches deep. The parallel drains from thirteen to fifteen inches wide at top, three inches at bottom, and thirty inches deep. There must be always six inches fall for the water from the parallel into the main drains, otherwise mud and sediment will accumulate and stop them up. Fig. 6, Nos. 1 and 2, will show sections of each drain, the depth, and width in inches.

Fig. 6.



No. 1. Main.

No. 2. Parallel.

The best time for drainag  is during summer, and when the ground is in grass or pasture. The first sod

that is taken off will cover the stones, and prevent the earth when filled in from getting in among them. If drains be made in winter, and suffered to remain open, frost and rain will break in the brows and fill them up, giving great trouble, and spoiling their shape; they ought, therefore, to be opened and closed as speedily as possible.\*

There are chiefly two kinds of materials used for filling these drains—broken stones and tiles. In Ireland it is a rare neighbourhood where stones cannot be procured to drain the land. Tiles are in common use in Scotland and England, and seem to suit the purpose well. Mr. Smith recommends small broken stones to be used, the drain to be well cleaned out, and the stones also clean and carefully put in. The depth of stones to be, in the main drain, eighteen inches, and in the parallel drains twelve inches; leaving, in all cases, at least eighteen inches of earth over the stones. A sod with the green side down put over the stones, and the earth returned and well tramped down.†

The tiles now in common use are generally of two forms, one half cylindrical, and resting upon a sole at the bottom of the drain; the other cylindrical, and fixed in each other, simply laid in the bottom.‡ It was formerly the custom to put stones, gravel, or other loose material over them, to a certain depth, but that is now dispensed with; the earth is returned and tramped in over them, and it appears they act well. It was also a custom to fill all drains with stones, or other materials, to within a certain distance of the surface; and it was erroneously supposed, that the greater the dimensions of the drain below, and the more porous the materials it contained, the more efficient it was; but experience has proved this to be altogether a fallacy. The deep narrow drain, with a few, say six, eight, or ten inches of stones, carefully put in, will discharge the water, and do its duty,

\* In filling the materials into drains the work should commence at the upper end of the field, and proceed downwards.

† Since the above was written, we find that Mr. Smith reckons twenty-one feet a good average distance between the parallel drains, and that six or eight inches of stones will be quite sufficient for the parallel drains.

‡ Diagram, No. 6,—3, 4, show sections of tile drains.



as well as one of four times its dimensions; due regard being always paid to the main drains, and the quantity of water they may have to discharge. The well-ascertained fact, that the water enters the drains by the sides and not by the top, explains the reasons of the narrow drains being so effective. Mr. Smith himself, is now recommending less stones to be put in the drains than formerly.

We have given but an imperfect and hasty sketch of the Deanston system of draining, for further information, we would refer to an excellent pamphlet on the subject, written by Mr. Smith, and which may be obtained for a trifle, at any bookseller's.

All human inventions and systems are more or less imperfect; the combined intelligence of one generation, is correcting the errors of a former, thus the improvement of the world progresses. Mr. Smith's system, excellent as it is, will, undoubtedly, yet be improved; particularly as the attention of so many very clever men has been directed towards it. Our own opinion is, that confining the depth of drains to thirty and thirty-six inches, in all situations, is not altogether correct; in every case where the fall would admit of it, we would make them, at least, *one foot* deeper. We have found deep drains discharging water when the shallow ones were not, in the same field, and we have universally found deep drains drying much more land on each side of them than the shallow ones; this is particularly the case where the land is wetted from under water. We would therefore incline to make the drains deeper, and less frequent, which would materially lessen the expense.

The great cost is the chief objection to the general introduction of thorough draining into this country. When the Irish farmer hears of £6, £8, or £10 per acre, to drain his land, he is frightened, and would rather go idle than attempt such a matter, even on a small scale; it is an excuse therefore for indolence, the mere name of the expenses. We know this is no legitimate argument against the system, but a great and important question arises, Can we not sufficiently dry the lands in this country at a much less expenditure? Or might we not begin, and go on by degrees,

according to our limited means and circumstances? Mr. Smith has stated, and justly, that the chief cause of the wetness of land in the United Kingdom, is surface water; but the question arises, why does surface water rest upon so much of the land? The simple reason is, the land is lying in *pasture*, or *waste*, not sufficiently *tilled* and *cultivated*; it has been trodden and beaten down during years, perhaps centuries. Land so treated, if it have any adhesive quality, will consolidate, and resist the passage of the water up and down. But *deep*, regularly cultivated land has not surface water resting upon it, therefore comparatively few drains will be sufficient to keep it dry; the obvious course will be, to break up, cultivate, and deepen the land. The surface water will then get down, and few drains will carry it off below. To begin and run a multitude of drains at a great expense, in uncultivated land, is certainly a procedure we would not recommend. A great portion, we might say, the greater portion, of our land in this country, is upon a free subsoil; if such were cultivated, subsoiled, and deepened, the water would disappear at the surface, and very little under drainage would be sufficient to dry it.

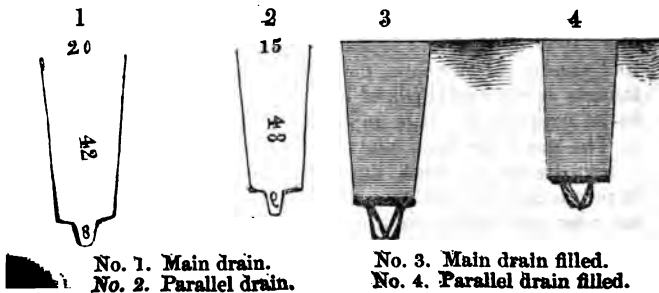
We give our opinion on this latter subject from very considerable experience. We have managed to dry very wet land at a comparatively trifling expense, and chiefly by the process we recommend, deep cultivation, though the soil is of a very tenacious and retentive character. The cost of the drainage has in no case exceeded £3 per statute acre, reckoning 2s. per load of 15 cwt., for stones (of a slatey description), and labourers' wages 1s. per day. Afterwards, trenching to the depth of eighteen inches with the common plough and spade, £1 per acre, making, on the whole, £4 per statute acre; and the land has been completely changed in its properties,—it is now dry and productive.

The mode we have adopted is quite simple. We run main drains at least four feet deep, transverse, or through all the hollows, at, say, fifty to sixty yards asunder, according to the nature of the ground; and from these we run parallel drains, up the slope, through hollows, and wet places, where *required*, at from twenty

to forty yards asunder, and where springs rise, keeping them as deep as the fall into the main drains will afford, having them all in cases not less than three and a half feet deep. If the fall of a field is regular, without heights or hollows, and not more than one hundred yards from top to bottom, one main transverse drain across the bottom, and if the fall will admit, it ought to be at least four feet deep, then parallel drains running up the declivity, also deep, three and a half feet at least, and the distance varying according to the nature of the soil and subsoil. We have found these deep parallel drains, in a heavy, retentive soil, drying the land on each side sixty feet, after being deeply trenched, and drying the shallow drains in the neighbourhood to a considerable distance.

In constructing and sinking our drains, we follow the principle of the old *plug drain*. When a man has room to work, the throwing out an extra quantity of earth will neither be tedious nor troublesome. When opening, we calculate the probable depth the drain will have to be sunk, and we regulate the width accordingly, from fifteen to twenty inches; this width we bring to from twelve to fifteen inches, and within six or eight inches of the extreme depth of the drain; then with the draining spade and scoop, we open in the centre, and six or eight inches deep, and the same width, a small drain for the materials, leaving a space or shoulder at each side for the cover to lie upon. A section of the drains, when opened, will appear thus—

Fig. 7.



No. 1. Main drain.  
No. 2. Parallel drain.

No. 3. Main drain filled.  
No. 4. Parallel drain filled.

It will easily be perceived, that the small drain at the bottom is to be the permanent drain, and in it the materials are to be deposited. The best, and in general the cheapest materials for filling such drains, are old worn down slates, refuse of flag or slate quarries, or any kind of stones that will split into a slaty form. To make a really efficient and permanent job, let one be placed on each side, meeting at the bottom in an angle, and reaching up to the shoulders, and across a slate, or coarse flags, or flat stones, be laid, resting on the shoulders on each side, also on the stones, confining them in their places and overlapping, and then we have an open space, an isosceles triangle. The water is confined to the angle in a narrow space, runs quickly, and keeps the drain clean; but if it be properly made, and the stones carefully put in, there is no possibility that any mud or sediment can get into it, or that it can at any time go astray—besides, a small passage in this will discharge rapidly a great quantity of water. Tiles made in the form of the ridge tiles of a house, would suit this drain, if covered with slates or soles overlapping, or the common tile of any kind; or in the absence of tiles and stones, boards cut thin would do both for sides and covers; or in a very tenacious, clay soil, and where the drain is deep, no sides would be required, but merely slates, stones, or boards laid in, resting on the shoulder, would make efficient and permanent drains. Or the narrow portion of the drain made a little wider, and filled up to the shoulders with stones broken small, and a sod laid across them, would make an excellent drain. It is quite obvious, that in the drainage of bog or waste land, these drains would be most efficient. If there be sufficient covers overlapping each other above the small or under part of the drain, this would raise the whole from ten to twelve inches, and there would be no occasion for sods, but merely let the earth be returned and tramped down.

Having thus briefly pointed out the necessity and importance of drainage, and likewise what we consider the best and most economical method of executing the work, we shall next enter upon a subject intimately

connected with, and indispensable to the permanent drying of the land.

---

## CHAPTER IX.

### THE THIRD ERROR.—NOT TRENCHING AND DEEPENING THE LAND.

THIS subject is intimately connected with the last, and is, in fact, the sequel to it. No land can be properly dried without trenching or subsoiling, after the drains have been made; but a large portion of our lands may be dried by this process alone. Simple draining, therefore, of retentive clay lands, will not dry them; the whole soil and subsoil must be unsettled and broken up, before the water can get down in every part, and find its way to the drains. After Mr. Smith had carefully drained his lands at Deanston, he found it was still wet; he therefore applied the subsoil plough, and he very properly recommended such a process always after draining; so that this operation is the consummation of drainage.

Water in the earth, as in the air, has two courses—one up and the other down. It sinks down in winter, and when much rain falls; and it rises up by attraction in the spring and early summer, when the surface of the ground is parched and dry, and the young and tender plants most require it. But the land must be in a proper state or condition, to allow these important natural processes to go on. If the soil or subsoil is hard, bound up, or (what is very common) a *pan* is formed, immediately under the active soil; when rain falls it cannot get down, and in dry weather it cannot get up, such land, therefore, is always too wet or too dry—there is not that natural medium of moisture and temperature, which is so essential to the growth and development of the plants.

If the farmer would consider how necessary air and water are to the life and growth of his crops during the summer, and how much they would add to the produce in harvest, he would endeavour to put his soil in a condition for acquiring and retaining them. There is no question that the condition of the soil, favourable or otherwise to the free operation of the natural agents, heat, air, and moisture, influences the growth and development of vegetables as much as manure. We have these facts practically verified in the management of the garden and the farm. The gardener trenches and deepens his land repeatedly. He is not satisfied with a few inches in depth of soil; he must have as many feet. He cultivates and rears the moist, tender, and delicate vegetables, fruits, and flowers. He brings them to a state of perfection; he changes their dispositions, habits, and appearances.

Nature grants him a license to sport with her productions, in order to show how far man, as an intellectual being, is responsible for his trust. He is continually increasing the number and variety of his plants, besides improving the quality. He collects the produce of the opposite zones; he settles them down, contented and prosperous, in a different climate. His native plants thrive, progress, and attain to a gigantic magnitude; they are prosperous and luxuriating in a deep soil, with plenty of food, during all changes of weather and seasons, when the crops in the field are in misery and starvation, and affected by the slightest vicissitudes or change in the weather. And how does the gardener accomplish all these great objects? Not certainly by manure alone; it is only an auxiliary. He succeeds principally by the judicious application of the great powers of nature—heat, light, air, and water. These he renders subordinate to his purposes, and by these he keeps his soil and crops in their proper condition. But turn to the farm, and what a contrast do we meet—the same few inches of the mere surface of the soil, that have been in requisition during centuries, turned and returned, scratched, exhausted, and dirty. The few plants that the farmer is contented to cultivate, following each other in suc-

cession for years, nothing new to renovate and change the course, the same kind of manure for the same crops, and derived from the same source, becomes useless or ungrateful, and the few plants he has every year becoming more deformed, delicate, and diseased, threatening to die off and leave him in disgust.

The plants in a deep soil are thriving during very dry weather; in a thin shallow soil they are tender and unhealthy; *for in proportion as the roots of a plant can get freely down in search of food in the soil, and food when they do go down, so in proportion will the stems rise above, thrive, and be productive.* We have evidence of this fact on the Model Farm at Glasnevin. We have trenched and deepened the fields in rotation, and the crops of all kinds are superior in consequence. We have always deepened the fields previous to sowing a turnip crop. The consequence has been, that during the months of May and June, when the weather is in general dry, the ground parched, and the turnip crop suffering, ours has vegetated and grown on vigorously; while fields in the neighbourhood were thirsting for rain, the young plants sickly and cut off by the fly, curbed in their youth, and eventually a failure. The chief secret of our success in producing large green and other crops, is, *the deepening the soil.* Farmers are always clever in finding out an excuse. When they see our superior crops, they exclaim,—“Oh! but see what a fine deep soil you have. Turnips, and potatoes, and grain, may well grow here; but we have a thin shallow soil, which will not grow such crops.” *It must be observed, that the soil, or the weather, or something, is to blame, but not the farmer.* Our reply is,—“Why have you a thin soil? You are as far from the centre of the earth as we are. Why not deepen your soil, if not immediately resting upon rock. You may do so, as we have done.” But we are met with another objection,—the subsoil is bad, and therefore they dare not touch it; that is, there is something wrong, and it must remain so—a regular Irish way of redressing grievances. But this brings us to another portion of our subject,—the nature of the subsoil, and how it may be improved.

A great portion of the farmer's difficulties are in prospective. We are in dread of a goblin, yet we have never seen one. The farmer is in dread of the pernicious qualities of the subsoil, because he has not tried it, or if he have, it has been done in such an injudicious manner as to ensure a failure in the experiment. But the question arises,—What is the difference between the surface and subsoil? They are in general composed of the same ingredients, of like materials; but the surface soil has been cultivated, repeatedly turned over, and exposed to the ameliorating influence of the atmosphere, air, heat, light, and frosts, the grosser particles broken down, the metallic substances oxydized, all mixed with, and enriched by organic and inorganic matter, in the form of manure. This being the case, why should not any portion of the under soil, which is lying idle, be brought up and treated in the same manner, with like success, and rendered equally fertile; but the subsoil has renovating and enriching qualities, which are always required above. Land which has been long cultivated, and the crops carried off, is exhausted of the inorganic manure, the salts of lime, magnesia, soda, potash, &c.; but these substances are in general contained in the subsoil, lying idle or dormant, and will become available when the soil is brought up, acted on, and decomposed by the atmosphere. By this means the land is renovated, and the necessary food supplied to the crops. The popular dread or dislike of trenching up the subsoil, has arisen, in a great measure, from the well known fact, that certain subsoils contain ingredients of a deleterious or poisonous character, which, coming in contact with the roots, produce disease and weakness in the plant; but this is the best reason why such subsoils should be improved, the poisonous qualities neutralized and removed. To bury and keep down a bad subsoil, is only perpetuating an evil. It has been found, that the deleterious substances in the soil are the salts of certain metals, of iron in particular. The well known *red till* abounds in this, and its noxious qualities arise from it. Now, red till, or any other such substance, may remain buried under the surface soil for



centuries, as it has done, without being changed in its properties; but trenching it up to the surface, exposing it to the action of the atmosphere, and mixing it with quick-lime, the lime will decompose the salt, by combining with the acid, and forming inorganic manure (a salt of lime,) at the same time, the metal being free, will immediately combine with the oxygen of the atmosphere, and form a harmless, if not a useful ingredient in the soil. On this principle of removing these noxious salts from the ground, merely subsoiling, stirring, or breaking up the subsoil, and allowing it to lie or remain below is recommended; the water and air get a free passage through it, and the noxious salts being soluble, are washed down into the drains. Besides the chemical changes produced in the soil, by the free admission of air and water, and its exposure to the atmosphere, trenching has the effect of permanently improving it in regard to the principal constituents, the earths, sand, clay, and lime. In mixing and blending them together, both surface and subsoil are put into a better condition, and a more happy combination is produced. It very frequently occurs, that the subsoil contains some of the earths in excess, which are required above, and *vice versa*. Say the upper soil is light sand, gravel, or peat, there may be clay, or marl, or both below. Land that has been frequently limed always contains much of this substance in the under soil, as its disposition is to sink. Now, if these are trenched up and intermixed, they are both brought into a favourable and fertile condition; the sand, gravel, or peat above gets a mixture of clay and lime, which will give them consistence and a capability of carrying all kinds of crops, and the light soil that replaces the heavy below, keeps the bottom free and open. In fact, there is nothing to prevent almost any farmer to have a fertile soil, and of any required depth, if he will only exert himself with skill. The same results follow the throwing down a heavy, and bringing up a lighter soil. The condition of the soil, in regard to a proper mixture of the earth, is of the first importance. They must be in due proportions to ensure high fertility.

There is nothing better known or more to be deplored in Ireland than the great competition for land. Almost every farmer wishes to have more than he holds, or can obtain; yet in nine cases out of ten he is not deriving benefit from more than one-half or one-third of what he does hold, even of the cultivated portion. He is labouring six inches deep where he ought to be at least sixteen. By the process we recommend he may easily double the quantity of his land, and afterwards less labour, less seed, and the same manure will do it, and he will more than double his crops. It is by these means the gardener renders the same space much more valuable than the farmer. It is by these means that the Belgian raises such abundant crops from an inferior soil; it is by repeated trenching and deepening the land, turning and returning; when he finds his soil tired, exhausted, and becoming dirty, he does not leave it under unprofitable pasture to rest; he cannot afford that as we do; he throws it down to rest and clean itself below, and he brings up a new soil in its stead; this he does repeatedly, keeping up the high condition and extraordinary produce at the same time.

Did we inhabit Australia or America, and had almost unlimited space to work upon, we might skim over the surface and take what we could get; but hemmed in as we are, confined to a spot, it behoves us to make the best of what we have; we may deepen, go down, but we cannot stretch on either side with impunity. -

In all retentive soils, draining ought to precede subsoiling or trenching. Without the means of taking away the superfluous water below, the land would be injured by either operation, but in a free open subsoil, no previous draining is required; and all soils, light or heavy, ought to be deepened. There is an essential difference between subsoiling and trenching. The subsoiling is usually performed by the plough, a heavy one made for the purpose, and drawn by four or six horses; it follows in the track of the common plough, and stirs and breaks up the subsoil to a certain depth *without bringing it to the surface*. Trenching is deepening, stirring the subsoil, and throwing a portion up on the surface; this has

also been tried with the plough, but the spade and three pronged subsoil fork is by far the best implement for either purpose, and if judiciously applied, we believe the cheaper. This latter assertion we know will be disputed, but we are speaking of Ireland and the small farms. On an extensive holding, such as the English or Scotch farms, where manual labour is dear, and where a multitude of horses are always kept, the farmer will subsoil cheaper with the plough; but in this country, when we count all expenses of horse keep, the purchase, the tear and wear of implements, and the low price of manual labour, we believe we shall be borne out in our statements. But the subsoil plough is not an implement for Ireland. We would ask, where is the farmer, or neighbourhood of farmers, who could purchase, maintain, and keep up, a subsoil plough with its appurtenances? How could they club the necessary team of horses, and train them to work; and which of them could guide the plough properly? We shall presently show that on a moderately sized, and what we could call in this country a large farm, the common plough with a pair of horses, followed by men or boys with spades or three pronged forks will do the work much *cheaper* and *better*.

There are various modes by which the land may be subsoiled and deepened, but that which is more simple, cheap, and efficient, is to be preferred to all others. For the small farmer, and where his land has been mismanaged or waste, there is no better mode than a repetition of the potato crop on the ridge or lazy-bed system; alternating ridge and furrow, making the ridges narrow and the furrows deep, during at least two years, by these means four-fifths of the land may be trenched any required depth, for the furrows after shovelling may be sunk, and the land may be conveniently drained at the same time in the furrows.

Any small field or plot of ground may be trenched in the usual way, with the common spade and fork, the latter to move and raise the subsoil. We would in no case recommend the shovelling out the loose subsoil, bring up any required part, and leave the remainder loose.

To commence, begin at one side of the ground, take out a spit in breadth and depth from the surface, and also the subsoil; remove this earth to the opposite side to fill the empty space up, when the ground is gone over. Take off the next upper spit, and deposit it where the under subsoil came out; cover that again with the next spit of subsoil, and so on alternating the soils until the finish, the ground will then be reversed, the subsoil above and the surface below. All such work ought to be done in autumn or early winter, in order that the ground get the benefit of the winter season. In spring it ought to be digged over *deep* to mix the soils with plenty of manure; it is then fit for any crop. To subsoil the same space of ground proceed in the same way, but instead of throwing up the subsoil, merely dig down, loosen it, and let it lie; the soils are not reversed in this case.

A variety of modes may be adopted, for deepening and mixing the soils either on small or large farms; and the operation is neither so difficult or expensive as is generally supposed.

Where horses are kept, and one or more ploughs are available, various methods may be taken, such as one plough following another; one taking off the upper sod, the other going below in the same track, deepening and throwing up a portion of the under soil; the second plough may have a small and narrow mould plate, which will admit it to go down with freedom. But of all modes yet tried, there is nothing so effectual as that by the spade, or what is better, the *three pronged fork*, or these and the common plough combined; the plough going before turning the upper sod as deep as it can, and the spade or fork following, going still deeper, either subsoiling or trenching. But if trenching and mixing is to be done (which in all cases we would strongly recommend more or less), the fork or spade goes the proper depth sixteen or eighteen inches from the surface, and not only loosens and deepens the subsoil, but also brings a certain portion to the surface, leaving it on the plough furrow; the quantity is optional, and this is an advantage the spade has over all other implements;

the exact depth can be gone to in all places, no balks or unevenness left in the bottom, and all stones thrown on the top; any required quantity of the subsoil thrown up, or none of it. Besides, the ground is left perfectly free and loose above and below, no heavy trampling of horses nor weight of plough below the stirred soil; the subsoil plough will stir a portion of the ground above it, but the great weight of the sole pressing the subsoil below, and the weight of four or six horses on heavy land, must tend to consolidate it.

We adopted a mode of trenching about eight years ago which we have carried out since, more or less every year, and with the greatest success. The field we intend to trench, we have it drained sufficiently, or at least main drains run in the hollows, to prevent an accumulation of water afterwards. We have it well prepared and planted in potatoes, in the ridge or lazy-bed manner, drawn out in nine feet ridges—six feet ridge and three feet furrow. In covering the sets, the earth will be taken out of the furrow about ten or twelve inches, and the shovelling again will take six inches more; this deepens the furrow to eighteen inches, and by this operation alone, *one-third* of the land is trenched, and the subsoil turned up to the air; but after this we go through every furrow with the fork or spade and loosen it twelve inches deeper, letting it lie. This comes to near the tops of the drains, the stones in which must not be disturbed; and we have now a furrow drain at every six feet, which will carry off all water into the receiving drains. But we want to deepen and trench the ridge also, and for this purpose, as soon as the potatoes are off the ground, and if possible before winter, we commence with the common plough and spade or fork. The plough goes up and down the brows of each ridge and takes off a furrow about nine or ten inches broad and nearly as much deep; this great depth can be taken without distressing the horses, in consequence of the surface being loose, and little friction or pressure against the mould plate; this furrow falling over into the potato furrow. The spade or fork then follows, going the depth required, say sixteen to twenty inches

from the general surface of the ground, and throwing what will lie upon it on the top of the plough furrow. The plough again follows the spade, and turns another furrow from the ridge into the hollow made by the spade, which again follows and takes up the bottom, and so on till they come to the centre of the ridge, where the plough throws a furrow right and left, leaves a double space for the spade or fork to take out, which will also be thrown right and left, leaving the centre of the potato ridge the new furrow, and the old furrow the centre of the new ridge, and so on to the end of the field. It matters not how many hands are employed at the digging; the plough can take the furrows off any required number of ridges, and when the spademen have taken out all the bottoms it returns and follows them. There may be from one to ten or twelve—as many as will keep the plough going; but if there be not a sufficient number to do so, the man and horses may go to other work, or to plough in another field, and be called when the diggers require him. We have found that from ten to twelve of our pupils, working at a fair rate, can keep a plough going; much, however, will depend upon the nature of the subsoil—if hard and dry more will be required. The boys working six hours per day, and reckoning labourers working the usual hours, and at the same rate, and being paid 1s. per day, a British acre can be trenched for from 18s. to £1 4s. This will do the work immensely better and much cheaper than any subsoil plough whatever. There is one advantage this mode has over subsoil ploughing; heavy clay subsoils that have been merely stirred without being mixed, will undoubtedly run together, consolidate, and require the same operation repeatedly; but by the other mode a portion of the heavy soil is removed, brought up, and a similar portion of the light, free surface takes its place below, which keeps the under soil open, and consequently absorbent.

The greater portion of the land which we have thus treated, has a very stiff, retentive, bad subsoil; was exceedingly wet; by very little drainage it is now sufficiently dry.

When we first commenced this mode of deepening the land, we suffered some jeers and scoffs, and were told, by what are considered high authorities, that by turning up the subsoil we had seriously injured the land for years; but all such prophecies have failed; the present state of the land and crops falsify such predictions. At the commencement of our operations on the Model Farm, there was not, on an average, more than from six to eight inches of surface soil—that being the depth at which it had before been laboured; it is now more than double that; and the crops and produce show the effects. From various parts of the country we have the most satisfactory testimonials of the success of our system, wherever it has been adopted.

Trenching done in a careless manner, and at an improper time, will not improve the land in the first instance. The field to be so treated ought to be first drained, and then a green crop taken—such as potatoes; the next year trenched, and followed by turnips, with plenty of manure. If this is carefully done the land will be brought into the highest state of cultivation. It will be dry, deep, clean, and rich; and if a proper course of cropping and after management be followed out, it will repeatedly repay the cost and expenses.

No farmer will improve permanently, or bring his land into high cultivation, by running over the surface, stretching his manure, giving it a kind of promise or apology, and carrying off a number of exhausting crops afterwards. He ought to begin with *one field* and improve it permanently; what is well done, does not require to be done again, even should he neglect the others for a time; go on to the second and third, and so forth to the end of his rotation. He will afterwards have little trouble, and will be repaid with compound interest.

In the spring the trenched field will have altogether changed its aspect; the subsoil will have changed its colour and consistency—what was before stiff and adhesive will be light and friable. It ought then to be harrowed and deeply cross-ploughed, bringing up a portion of what was before put down, and burying a portion of

what had been brought up; mixing upper and under soil thoroughly, and cleaning the ground, which can be done at this time most effectually. When drilled up the ground will be in the most beautiful condition for the turnip or other green crops.

We have now gone over the chief errors in regard to the permanent improvement of the soil; we shall go on and point out other instances of mismanagement.

---

## CHAPTER X.

### THE FOURTH ERROR.—THE EXHAUSTING THE LAND BY A SUCCESSION OF GRAIN OR OTHER CROPS.

CHEMICAL science has unfolded to the agricultural world a series of most important facts, in regard to the nutriment or food of the animal and vegetable creation. With respect to plants, it proves that their food and nourishment are of two kinds; one, aeriform, or gaseous matter—a great portion of which is derived from the air; the other of a more solid and mineral character, and altogether derived from the earth. The first we call the organic, and the latter the inorganic food. Dead and decaying animals and plants supply both, in the form of manure; the plants depend upon the soil for the inorganic portion entirely, and if there is a scarcity in consequence of a demand or drain previously, the plants lack their food, become unhealthy, weak, and eventually die off. These results are attained by chemical analysis, which has also discovered that different kinds and classes of plants require and live upon some peculiar kind of inorganic food, the absence of which from the soil prevents the healthy growth and due development of such crop, or its presence altogether. The chief inorganic substances that compose this food are, the alkalis and other oxides, in combination with gases and combustibles, forming acids and salts, and all



the grain, and other cultivated crops, plants, and roots, have each their particular favourite and necessary food among these substances. The grain crops require the salts of lime, magnesia, soda, potash, &c. &c., and the silicate of potash; and all the different tribes and species of plants require this mineral and indispensable food.

From these established facts we may fairly conclude, that if any particular crop, such as wheat, oats, barley, &c., has been cultivated during a succession of years upon a farm or field, the grain and straw carried off repeatedly, without any return of the inorganic substances—no fresh supply being furnished in the shape of manure—the land will become exhausted by these grain crops, and incapable of producing them in a vigorous and healthy state. Many other reasons may be assigned why land becomes tired of producing grain crops, taken in succession without intervening crops of another description; and why such crops become poor, of little value, and eventually refusing to grow, as in the case of land becoming clover sick, and refusing to produce that plant at all.

But all grain are particularly exhausting crops, as all crops that ripen their seed upon the ground are; their straight stems and narrow leaves render them, in a great measure, incapable of extracting much organic matter from the air; they must, in consequence, depend more upon the soil.

Another serious objection to the succession of grain crops, is, the encouraging the growth of weeds, which exhaust and foul the land. Grain is usually sowed broadcast; and, in that case, the roots and seeds of most weeds cannot be extracted, but will remain in the ground, increase and multiply—the usual cultivation for grain crops being equally favourable for weeds; the consequence is, the latter plants displace the former, and the farmer is compelled to leave his land out to pasture, in consequence of the triumph of the weeds.

A great difference of opinion has arisen among the learned chemists and vegetable physiologists, as to whether plants, like animals, absorb more aliment than

they can assimilate, and give off the excess as excrement. De Candolle was the great champion of this theory—Sir Humphrey Davy also seemed to favour it; and though they did not altogether demonstrate the fact, it is certainly quite agreeable to analogy. Our great chemists of the present day are opposed to this doctrine, but they have as yet failed to prove it false. If it be true, it is very likely that the excretions given off by a plant can neither be agreeable or useful to a succeeding one of the same kind; until the substance has undergone decomposition, which it has time to do in a rotation or change of crops, the excrement of one kind being rather advantageous than otherwise to the other. If this idea of the excrement of plants be correct, it is another strong argument against a succession of grain crops.

But the greater evil that arises from the system is, these grain crops are not profitable for the cultivator. The farmer who depends chiefly on grain crops for his rent, and other expenses, will always find himself bare and busy; this is the case on large and small farms, but on the latter it is absolutely ruinous. The land in both cases is always in poverty, from continued exhaustion, and want of manure, the crops wretched in proportion. This state of things is not confined to the small farmers of Ireland; it prevails throughout the united kingdom. It is this system which creates the necessity for the summer fallow in England, and, in some instances, in Scotland; the search after and purchase of guano, and artificial manures; the absence of green crops, a sufficiency of cattle, and, consequently, of home made manure. The large farm, and the large capital, keeps the farmer from poverty. But the small farmer, on this plan, can neither pay his rent nor feed his family; all that he raises from his farm would be insufficient for the latter purpose; therefore, he is in general worse than bankrupt.

An intelligent traveller passing through the country in the autumn, or early winter, and taking even a cursory glance at the appearance of the small holdings in the several parts of Ireland, will be impressed with the

truth of what we have been stating. He will see the small farm with its stock and produce. We will take the farm at from four to twelve or more acres, and the stock, in general, consists of a wretched, half-starved horse, a worse fed cow, a pig, and, perchance, a goat; a wretched cabin, with worse offices; and, behind the house, in what is called stack-yard or garden, for it cannot be properly denominated either, is the farm produce of the season—two or three huts of grain, and as many small pits of potatoes, and this is all that is to pay the rent and keep the family. Now, if the rent is exacted, the family may beg or starve; and if the family eat the produce, the landlord gets no rent. But there is still a middle course, or alternative. The farmer, or his sons, or both, with the horse, work for the landlord at low wages, or on public roads, or attend the English or Scotch harvest, the savings from which pay the rent—and they lead a dog's life (*hunger and ease*) the remainder of the year. Yet the poverty and privations of the people are attributed to bad government, bad laws—whereas, in fact, it is chiefly ignorance and bad management on the part of the people themselves.

---

## CHAPTER XI.

### THE FIFTH ERROR.—THE NOT FOLLOWING OUT A REGULAR ROTATION OF CROPS.

WE have before pointed out the effects of taking a succession of grain crops, and we now come to show the importance of a change of system, and the adoption of a regular scientific course of alternate husbandry, called a rotation.

There is nothing more clear than that land cropped on the usual system, two or three different kinds of grain crops with occasionally potatoes, must become exhausted and tired—that such plants will become deteriorated

and leave us altogether; therefore, it is of the greatest importance that we should take a wider range of cropping, increase the number and variety of our plants, and in every case keep the cultivation of the same plant on the same ground as far asunder as possible.

A very common course with our farmers is this; to cultivate a few *pet* fields convenient to the homestead, where the manure can be easily laid down, and the produce drawn in. These fields they call their good land; it is so, for it gets somewhat fair play. The out fields again are ploughed and sowed with grain crops while they will give any return, and until they are overrun with weeds, they are then allowed to *rest*, dirty, and poor; and this is the bad land, simply because it is badly managed.

Alternate husbandry means a change of crops each year; a different kind or species of different habits and properties on the same field. In the improved system the kinds which we alternate are the several grain and green crops, and as the various plants require various kinds of food, manure, and management, the land gets all the benefit of those various changes, a more improved mode of culture, and superior quantity and quality of manure.

The green is the renovating crop, for with it the land is cleaned and manured; the grain is the exhausting or foul crop, and requires to be immediately followed by the cleaning crop, and the manure following in regular order. All the land is not only regularly cleaned, but is also regularly manured, and it is regularly refreshed and rested. There is no exhaustion or poverty.

The great utility of order and system in every thing, but particularly in the operations of the farm and the courses of cropping will be evident to every intelligent cultivator.

Besides the regularity of manuring and cleaning, the work of the farm comes regularly through the week and the year, and of course is done much better and cheaper; even the various crops are more suitable for the food of man and beast, and at all the proper seasons. The same kinds or description of crops are kept far asunder,

and if excrement is produced it does not nauseate the kindred plant, it has time to decompose.

Where rotations are understood, there are great varieties of them, according to the skill, taste, or even caprice of the farmer, but they ought to be regulated by the various circumstances of soil, climate, and situation. The first regular rotation that was known, and generally adopted in different parts of the United Kingdom, was the Norfolk, or four course shift, (shift, so named from the crops moving or shifting from one field into another.) From the success with which it was carried out in that county it became quite a favourite and was followed in soils and situations as different as possible, and not at all calculated for the course; latterly, however, it has been much deviated from, and the five and six courses adopted.

We shall endeavour to give a short, but clear explanation of the most common useful rotations, and when these are understood, the whole subject and the variations which may be adopted will be obvious.

*No. 1.—Three course rotation.*

	Field 1.	Field 2.	Field 3.
First year,	Potatoes, turnips, &c.	Grass for soiling and hay.	Oats, or barley and seeds.
Second year,	Oats or barley, &c., with seeds.	Potatoes, turnips, or mangel.	Grass for soiling, and hay.
Third year,	Grass for soiling, and hay.	Oats or barley, or wheat with seeds.	Potatoes, turnips, and mangel.

The most plain and simple of the common rotations is the three course shift; it is in its first form only applic-

able to small farms, but it is the base of a very extensive course of rotations, and may be adopted on a farm of any extent. It is the peculiar shift that suits house-feeding, and by following which a teacher or labourer holding an Irish acre of land may keep a cow and a couple of pigs through the year, and have some potatoes, oatmeal, and other necessaries besides.

The foregoing diagram will explain its nature.

Being a three course, the land must be divided into three fields; the upper portion marked, 1, 2, 3, will show the fields and the farm the first year, with the crops over all. For the better explanation, we show the farm the second year, with the shift of the crops on the second row, marked second year; and we again transfer them to a third row the third year, which ends the rotation; and on the fourth year we commence as at first, and go on again cropping and manuring.

We begin at field No. 1, which ought to be drained, trenched, and deepened, if not previously done, in this we put the green fallow crops with manure; in the second field we must have our grass for soiling and hay; but in commencing a farm, if there be no grass, vetches and cabbages with Italian rye-grass must be sowed for feeding until the rotation is complete. In field No. 3, we sow oats, or barley, or wheat, or flax, or a part of each; with grass seeds and clover for soiling, and hay the next year; these are all the various crops of the small farm the first year. In the grain crop field, it is well to sow oats with seeds, as the straw is better for feeding the cows than the barley or wheat straw. The first field, containing about half and half potatoes and turnips—the potatoes for the family and pigs, and the turnips for the cows; and besides turnips, mangel-wurzel, cabbages, or rape may be taken off, if they suit the soil. As with regard to the grass field, the kind to be sowed ought to be considered according to the disposition of the ground. The Italian on all drained rich land is to be preferred. At the end of the course it will be perceived that every field has been regularly cropped, laboured, and manured; and on the fourth year the same course begins again. The potatoes commence in

the first field and end in the last, and will again go into the first field on the next year. In like manner, the grass commenced in the second, ended in the first, and will go on to the second again on the fourth year. The same is the case with the oats and grass seeds. The grass is for soiling, and hay for the cattle, and ought to be ready for cutting when the turnips, mangel, and other winter provender is done.\* The cutting of it must be continued until the second crop comes forward, when the remainder and as much as possible is to be cut and saved for hay in winter. The grass must be assisted by a small portion of spring vetches, sowed in the oat field, which will come in for feeding between the first and second cutting of grass, or winter vetches sowed the previous autumn, on a portion of the turnip ground. Cabbages, which are excellent summer and autumn food, ought to be cultivated in the field, in the garden, and every available spot of ground; they will materially assist the summer feeding and save hay. Mangel wurzel and other leaves with the clearings of ditches and weeds will also much assist, if carried in and given to the cattle. What they do not eat will make their beds, and afterwards excellent manure.

The principle of the three-course rotation is simply, that one-third of the land is in green fallow crop, one-third in grass, and one-third in grain, and that one-third of all the farm is manured every year. This can only be accomplished by house-feeding and great attention to the manure heap; but such a course is calculated to bring the land into the highest condition. The cropping also particularly suits house-feeding. We have found, from long experience, that one-third in grass will keep the proper quantity of cattle in soiling and hay, one-third in grain, the straw of which will fodder and litter them, and one-third in turnips and potatoes, will give a large proportion of food for man and beast.

The principle when extended is suitable to every sized farm. It may be carried out on three fields, or any multiple of three; on six, nine, twelve, fifteen,

\*The Italian rye-grass alone will be ready in the proper time, and ought to be preferred to all others.

eighteen, &c. &c., and the crops immensely varied, and in separate fields, care being taken to maintain the principle, and due proportions. The six course rotations will explain this more fully.

## FOUR COURSE ROTATION.

We have before stated that the four course rotation has been long a favourite, and carried out in a variety of forms. It is not, however, so suitable to every variety of soil as the other, nor is it calculated to maintain a sufficiency of cattle to keep up the manure and condition of the farm. It is best calculated for the strong heavy soils that will bear a great deal of culture and cropping; but, like other rotations, it may be varied to suit almost every circumstance.

Like the three course system, it is the base of an endless variety of rotations, for it may be on four, eight, twelve, sixteen, twenty, &c. &c. fields, and the crops varying accordingly. The diagram No. 2 will explain its simplest form.

*No. 2.—Four Course Rotation.*

	Field 1.	Field 2.	Field 3.	Field 4.
Year 1.	Potatoes, turnips, or mangel.	Oats.	Grass.	Barley or wheat, with seeds.
Year 2.	Barley or wheat, with seeds.	Potatoes, turnips, &c. &c.	Oats.	Grass.
Year 3.	Grass.	Barley or wheat, with grass seeds.	Potatoes, turnips, &c. &c.	Oats.
Year 4.	Oats.	Grass.	Barley or wheat, with seeds.	Potatoes, turnips, and mangel.



In comparing this rotation with the first, it will be observed that the additional field is under a grain crop. There is the same number of green crops in each, but there is in this two instead of one grain crop, exhibiting in one year regular alternate husbandry, two green and two grain crops; but in the first, one-third of the land is manured, in the latter one-fourth, and instead of one-third in grass there is only one-fourth in the four course—an essential difference in manuring and in the food of cattle. The crops shift over from one field to another in the same regular order as in the three crop, and arrive at their respective destinations at the end of the course; on the fifth year they commence again as on the first.

It may be necessary to observe here that in numbering the fields, it is not imperative to have them in the same order as exhibited in the diagram. No. 1 may be where No. 4 or No. 3 is, or No. 3 where No. 2 is; but after they have been laid off marked, and the cropping commenced, they must follow each other in numerical order; a breach of this is what we call *getting through* or breaking the rotation.

#### THE FIVE COURSE ROTATION.

We come now to explain a very common and useful rotation—the five course. This is much followed by our intelligent farmers, who still practise the pasturing of their cattle. It gives an additional field of grass for pasture; but it is quite applicable to house-feeding. The second grass field may be cut for hay or soiling. We would, therefore, in all cases, prefer this to the four course. The figure No. 3 will explain it.

## No. 3.—Five Course Rotation.

	Field 1.	Field 2.	Field 3.	Field 4.	Field 5.
Year 1.	Potatoes, turnips, &c.	Oats or flax.	Grass, 2nd year.	Grass, 1st year.	Barley or wheat, with seeds.
Year 2.	Barley or wheat, with seeds.	Potatoes, turnips, &c.	Oats.	Grass, 2nd year.	Grass, 1st year.
Year 3.	Grass, 1st year.	Barley or wheat, with seeds.	Potatoes, turnips, &c.	Oats.	Grass, 2nd year.
Year 4.	Grass, 2nd year.	Grass, 1st year.	Barley or wheat, with seeds.	Potatoes, turnips, &c.	Oats.
Year 5.	Oats.	Grass, 2nd year.	Grass, 1st year.	Barley or wheat, with seeds.	Potatoes, turnips, &c.

The only difference between this and the four course is one more green crop, an additional field of grass, and one-fifth instead of one-fourth of the land manured every year; the other crops are the same. This has certainly become a more favourite, as we believe it is a more profitable rotation than the four course. The crops follow each other as in the other courses, and on the sixth year the course will recommence. A prepossession in behalf of the five course rotation is, that the land is not so much *hacked* out; it gets more rest in grass. But if land is well managed and manured, it is very questionable if it requires such rest. On this principle certain light inferior land has been worked upon a six course rotation. By this means less labour is required, and it lies longer to rest and consolidate. The following figure will explain the course:—

*No. 4.—Six Crop Grass Shift.*

Field 1. Field 2. Field 3. Field 4. Field 5. Field 6.

Year 1.	Potatoes, &c.	Oats.	Grass, 3rd year.	Grass, 2nd year.	Grass, 1st year.	Barley, with seeds.
Year 2.	Barley, with seeds.	Potatoes, &c.	Oats.	Grass, 3rd year.	Grass, 2nd year.	Grass, 1st year.
Year 3.	Grass, 1st year.	Barley, with seeds.	Potatoes, &c.	Oats.	Grass, 3rd year.	Grass, 2nd year.
Year 4.	Grass, 2nd year.	Grass, 1st year.	Barley, with seeds.	Potatoes, &c.	Oats.	Grass, 3rd year.
Year 5.	Grass, 3rd year.	Grass, 2nd year.	Grass, 1st year.	Barley, with seeds.	Potatoes, &c.	Oats.
Year 6.	Oats.	Grass, 3rd year.	Grass, 2nd year.	Grass, 1st year.	Barley, with seeds.	Potatoes.

This rotation differs from the four and five courses, principally in the quantity of grain or grass crops. The other kind of crops are similar, except that on such light soils as suit this shift, wheat cannot be well grown.

There are in this two more fields of grass than in the four, and one more than in the five course rotations. One-half of the land is in grass; but if it gets more rest it gets less manure, except the pasture land, one-sixth of the farm only being manured and in fallow crop. A farm on such a course is favourable for the rearing of young cattle and sheep.

Another and a much better six course rotation may be adopted on the principle of the three already explained, and suitable to almost every soil and situation, much

better calculated for raising more value from the land. This will show an instance how the three course may be varied, yet the principle retained. Fig. No. 5 will show this course.

*Fig. 5.—Six course rotation.*

	Field 1.	Field 2.	Field 3.	Field 4.	Field 5.	Field 6.
Year 1.	Potatoes.	Grass, second year.	Grass, first year.	Barley or oats, with seeds.	Turnips, &c.	Wheat.
Year 2.	Wheat.	Potatoes.	Grass, second year.	Grass, first year.	Barley, or oats, with seeds.	Turnips.
Year 3.	Turnips and mangel.	Wheat.	Potatoes.	Grass, second year.	Grass, first year.	Barley, or oats, with seeds.
Year 4.	Barley, or oats, with seeds.	Turnips, &c.	Wheat.	Potatoes.	Grass, second year.	Grass, first year.
Year 5.	Grass, first year.	Barley, or oats, with seeds.	Turnips.	Wheat.	Potatoes.	Grass, second year.
Year 6.	Grass, second year.	Grass, first year.	Barley, or oats, with seeds.	Turnips.	Wheat.	Potatoes.

The cropping of this course shows the correct principle of the three course carried out. There is one-third of the farm in green fallow crop, manured; one-third in grass; and one-third in grain. But, instead of being in one field, each of the classes are divided, and in separate ones; the potatoes in one and the turnips in

another. Wheat follows potatoes best; for the potatoes can be taken off in time to allow the autumn sowing. Turnips are followed by barley or flax in the spring; this gives time to get off the turnips, and the crop is in general more favourable to the growth of barley than of any other grain. It may be objected that potatoes after lea is inconvenient, the ground being difficult of preparation; but, when it is prepared properly, the succeeding crop will, in general, pay all the extra cost and labour, both in quantity and quality. To obviate this difficulty, another crop may be taken, oats after the lea, and before the potatoes; but there must be another field, and a seven crop course; or an eight years' course may be adopted on the principle of the four—and a crop of flax be taken after the wheat.

There is a six years' course adopted in Scotland, and in much favour, where the soil is of a heavy, strong description, and where cropping, rather than the keep of cattle, is followed. It is merely the introduction of two extra crops into the common four course rotation; viz., beans and wheat. The oat stubble is manured in the autumn and ploughed, and then sowed early in spring; the wheat follows then. Beans and peas are remunerative crops, and might well come into our rotations instead of potatoes, which we have been cultivating far too extensively; but this can only be on heavy clay lands. Peas will grow on almost any soil, even in a poor and exhausted state.

It is perhaps unnecessary to give any more examples of specific or particular rotations. We have explained the three, four, five, and six courses of cropping, and the science of rotations in general; these are the basis or foundation of all others, which have been, or may be hereafter adopted; but it is obvious they may be changed or diversified almost to infinitude—new plants and new modes of cultivating our present crops must arise. The progress of agricultural improvement will alter and vary our courses. The really skilful and scientific farmer will be able to suit the rotation to his soil, so as to keep it in high condition, and at the maximum point of production.

## CHAPTER XII.

## THE SIXTH ERROR.—NOT CULTIVATING GREEN CROPS.

WE have already pointed out the disadvantages the farmer labours under, by confining himself to the cultivation of a few plants in succession, year after year on his farm, and we have also shown that by alternating these crops, with a greater variety, and of different habits and character, he would not alone renovate his soil, but he would materially improve and add to the quantity and quality of those to which his whole attention has been hitherto directed. In the choice of his crops he has been rather unfortunate, for grain, though very important and necessary in its place, is by no means the most lucrative and best paying crop that land will produce; any of the usually cultivated green crops is more valuable and will sell for a higher acreable sum, than the best of the grain crops. Let us take turnips, mangel wurzel, or cabbages, as an instance. A statute acre of land in well cultivated turnips will produce from twenty-five to thirty tons, say twenty-eight, and these at the lowest average price, 15s. per ton, will be value for £21. Now the best grain crop that can be raised, will not bring much more than half that sum, and if the land is favourable for mangel or cabbages, either of these will bring more money than the turnips. But it may be said that the green crops take a great deal of labour and manure; we will grant that to be the case, but if they take more labour, the land is well cleaned and cultivated, and on the succeeding year, if such crops be judiciously applied to the feeding of stock, there will be a double quantity of manure returned to the land. It is in this way that green crops are so valuable to the farmer; it is not by selling them off the land, for no prudent farmer will do that; it is by feeding cattle, sheep, and swine, that he renders his green crops so valuable—his land is brought into high cultivation and condition by the extra manure

from his stock, and his pocket is replenished by the sale of milk, butter, beef, mutton, and pork. These latter are the produce that swells the purse, and solely on these ought he depend for his rent and taxes; he ought never to thrash his grain to pay the landlord, no thriving farmer does this; the grain crops at least ought to be his own perquisite. The green crops and cattle ought to be his main stay; in fact, green cropping and house-feeding is the secret of successful farming at the present time. The intelligent, improving, and thriving farmer or neighbourhood, is easily distinguished by the surface of the land, the kinds and quality of the crops cultivated. If we see plenty of turnips, &c. we see also luxuriant grain crops as a necessary consequence, and the absence of the green crops shows ignorance, poverty, and embarrassment.

The most important of the green crops at present cultivated are potatoes, turnips, mangel wurzel, cabbages, rape with clover, and the cultivated and pasture grasses; the legumes, beans, peas, vetches, &c. are also ranked with them.

The nature of green crops is not to exhaust the land, but to depend upon the atmosphere for the greater portion of their organic food—their broad extending leaves enable them to do so; therefore the farmer who cultivates them, gets not only the benefit of his own manure, but from the air, he receives a portion of the best materials of his neighbour's, which have been suffered to run to waste or decompose on the pasture fields. They are in another respect less exhausting on the soil; they are taken up before they ripen their seed upon the ground.

The great advantage attending them, however, is, they keep up a regular and plentiful supply of food for the stock, summer and winter; and this supply is raised from less than half the land that was formerly appropriated to the same quantity of stock on the pasture system, leaving an additional quantity for the necessary grain crops. In pasturing, the value of cattle during winter was unimportant. They were poorly fed on dry hay and straw, and were consequently deficient both in milk and flesh; but the case has become altogether re-

versed by green crops—the cattle are equally well fed in the winter as in the summer, are equally productive, and the produce is more valuable, sells better in the winter than in the summer months.

Another source of great profit from these crops, is the feeding of an additional quantity of pigs. A comparatively large number of these valuable animals may be kept during summer on vetches, clover, leaves of mangel, cabbages, &c., with buttermilk or whey to drink, and fattened off in winter upon the small potatoes and other refuse.

---

### CHAPTER XIII.

#### THE SEVENTH ERROR.—THE NOT KEEPING A SUFFICIENT NUMBER OF CATTLE.

THIS subject is intimately connected with the last. Green crops and cattle ought never to be separate. We have before alluded to the importance of these crops as the best source of manure. We shall now be a little more minute upon the subject.

It has been fully ascertained that a cow well fed through the year in the house, with the assistance of a pig or two, the solid and liquid excrements being properly mixed and preserved, will make twenty-five tons of rich dung. But this quantity is sufficient to manure a statute acre of land for almost any crop. Therefore, we estimate a cow to manure an acre. We shall presently show that the proper quantity of cattle on small farms where no horses are kept, ought to be, a cow to every *two British acres*; and in such case, one-half of the farm may be manured every year from its own resources. This will, of course, soon bring it up, and keep it in the highest condition. Green cropping and house-feeding, therefore, excels all other systems, so far as manuring and the condition of the land is concerned.

Next, as to actual and direct profit, we shall show



that it is equally excellent. From very considerable experience and minute observation, we have ascertained that an average cow, well fed in the house during the year, summer and winter, will produce *eight quarts* of milk in the day; and we cannot be far astray in estimating the value of the milk at twopence per quart, whether it be sold new, churned for butter, or made into cheese. Now, at this rate the cow's produce in the the year will be £24 6s. 8d.; and this we call an average sum. But any milch cow, fairly fed, will be worth 1s. per day—£18 5s. per year. This is what we consider the lowest estimate. We have heard of £40 per year; but these are exaggerated or extreme cases. There can be no question, however, that *an uncommonly good cow, uncommonly well fed*, will yield an astonishing produce in the year, perhaps all that has been stated; but these can only be rare instances. The lowest sum we have mentioned may be made in almost every case. Now, if a cottier or labourer can keep a cow on an Irish acre of land, which has been fully proved, and suppose he pays for that and his cottage £5 annually, he can have no difficulty, by the sale of his overplus butter, to pay his rent; then, with the remaining produce of cow and field, with at least one good pig in the year, he and his family may live very comfortably, if they can obtain any out-labour at all, with fair wages. The additional advantages of a cow are to such a class a blessing, rather than being confined to the uncertain day's work, and low and precarious wages. But if the cow is worth a shilling per day, and if the man would only attend her and cultivate the acre, he would secure himself seven shillings per week through the year. Under these circumstances we would ask, *How could the condition of the labouring classes, the poor cottiers, be improved so readily and cheaply, as by giving every one of them an acre of land at a fair rate, on which they may keep a cow and a pig?* and where will we find the extensive farm in Ireland, that there are not as many odds and ends, as many useless fences and waste about it as would give each of the necessary labourers this quantity without loss.

But it will be said, If you do this, it will render them lazy and careless about further work; and then there will be a want of labourers for the large farms. This very common assertion we would distinctly deny. *We never brutalize a man, by rendering him comfortable and independent;* we give him more exalted ideas and a desire to become more independent still.

But to return to our subject. Let us take more than an acre of land, and where more cows are kept—say eight statute acres—on which, according to our estimate, four cows ought to be, and we shall take the lowest estimated value of a cow, £18 5s. per year; we get the sum of £73. Divide this by the number of acres, and we have £9 2s. 6d. per acre from the cows alone,—not to speak of the crops that may be sold from land in such high condition, as it must be, when so much manure is continually being added. We put it to any cultivator of grain crops, whether it be in his power to produce any such acreable sum over the whole farm, as the cows alone will do in this case. This estimate will hold good with all small farms, where the proper quantity of cattle and no horses are kept.

It may be necessary here to remark, that these estimates are not taken in a loose, chancy, or incorrect manner; they are the results of experience and close observation during many years, in all of which time the produce and value were regularly noted down, under various circumstances, change of soil, food, and cattle at all times house-fed. These accounts are still forthcoming, if required. Farmers will say, that even £18 is a large sum for a cow to make in the year. They think the thing incredible, because they have never experienced a well-fed cow or what she can produce. There is an essential difference between a cow milking about *half the year*, and another milking the *whole year* round. It is only the house-fed cow will stand to the pail through the year. When we speak of a cow to two British acres, we mean that to be the proportion where no horses are kept; but on large farms, where horses are necessary, or on any farm, the horses make an essential difference. As with regard to the

stock of cows, every horse displaces two cows; and the ratio will then be as British to Irish measure; that is, on horse farms a cow to two *Irish acres*.

Besides their manure and milk, there is another source of emolument arising from the keep and judicious management of cattle. When the cow becomes old she can be fattened, or sold at calving, and some of her progeny may take her place. There ought to be on every well-regulated farm a rotation of cattle as well as a rotation of crops. No farmer ought to lay out money on the purchase of cattle if he can at all avoid it. There ought to be, according to the size of the farm, a certain number of calves reared every year; the same number one year old, two years old, and three years old; the latter with calf, to take the place of the old cows disposed of, or to be sent to market for sale. The bullocks for the plough and the stalls. If such judicious management be carried out, even in a small way, with the addition of what is raised by the pigs, it will form a very important item in the farmer's profits. This ought all find its way to the savings' bank to portion the daughters, or educate and advance the sons. The capability of keeping pigs will always depend upon the quantity of cattle; as whey and buttermilk will always form an important portion of their food.

This great error—the want of cattle on the cultivated land, and of house-feeding—is by no means confined to Ireland; it prevails through the United Kingdom, and perhaps the world. In the best cultivated districts of England and Scotland there is a lamentable neglect on this head. The consequence is, the great poverty of the land, and the rage for foreign and extraneous manures; but those farmers will yet find out the error of their ways.

As the entire success of the system we recommend depends upon the manner in which the cattle are fed, whether in the fields or in the house, and as great ignorance and difference of opinion prevail upon the subject, it may be necessary to offer a few remarks upon it here. Like most other matters of controversy, we find the party who know least of the subject most pertinacious.

This is particularly the case with the farmers of the old school, on the subject of house-feeding. They have not tried it, and yet they condemn it. Certain assertions, or what are termed arguments, have been advanced against house-feeding; but not a single fact to support them. It is only necessary to refer to a few of these statements to show their absurdity.

“The house (say these sages) is not the natural situation for cattle; they ought to be in the open air, in the open fields.” “It induces delicacy and want of health, and consequently they must deteriorate in their milking and fattening properties;” and that, “young cattle reared in the house are never so hardy and valuable as stock reared in the fields.” We shall take the first of these assertions,—that a cow kept chiefly in the house is not in her natural state; and we would ask, what the natural state of a cow is? and who has ever seen the phenomenon? The wild cattle in Chillingham Park are not in their natural state; they are confined in an enclosure, on a particular soil and pasture; the only approach to the natural state is, they have cover and shelter in the woods and plantations summer and winter. Our farmers have been used to treat their cattle in a certain common way, and this they call the natural state. By the pasture system they cannot remain in the open fields during winter with any advantage or profit. They have, in the best situations, only four or five months in the summer good and abundant grass in the fields; in the autumn it fails, and they must be artificially fed in the winter, and housed. Even during the summer the immense majority of the cattle are badly fed; confined on poor pasture; tied perhaps by the horns or legs; fretting in a circle, in a half-starved condition; and in the winter and spring months, under the inclemency of the weather on a bleak hill side, eagerly searching over the bare fields and ditch sides for a scanty bite of unwholesome grass or weeds. Surely this can be nothing approaching to the natural state or inclinations of these animals. Where we would suppose cattle to be found in their natural state, is in the immense prairies of the American Continent; roving

at pleasure amidst the most luxuriant herbage, with the cover and shelter of the magnificent forests at all times and seasons. And we will maintain that cattle properly house-fed approach nearer to this state than our half-starved pasture stock; the former having always plenty of good food, and shelter from the cold in winter and the sun in summer. The cow is an animal that requires very little exercise indeed; her structure and formation proves that; her better qualities will always be developed by food and rest.

We come to the next objection against house-feeding—"That it produces delicacy and bad health." This is also a gratuitous assumption, which all experience and common observation negative. Of course if an animal be delicate, it must be from want of health; some disarrangement of the organic structure, which will immediately show itself by the loss of condition. But house-fed cattle, of all others, rapidly acquire and show condition; the accumulation of flesh, fat, and milk, if the animal is in the latter condition, goes on more rapidly in the house than in the field—and what but health could induce such a state of things? What an enormous quantity of flesh has been added to the consumption of the United Kingdom by house-feeding! It is now admitted that a beast cannot be thoroughly fattened—finished off—on the best pasture without being for a time fed in the house. The first-rate cattle that are annually exhibited at the Smithfield and other shows are all house-fed. If, therefore, house-feeding be ungrateful to the animals, and induces disease, how do these things come to pass? It is the badly fed and kept pasture cattle that are in low condition, delicate, and liable to disease. For one complaint that is brought on and induced by house-feeding and high condition, ten arise from starvation and bad keep in the fields.

There is a very common opinion abroad, not alone among farmers, but it has been promulgated by theoretical writers, that a cow on pasture will give more milk and butter, and of better quality, than a cow house-fed. This idea, like the others, has arisen from ignorance—the not knowing what a house-fed cow can

actually produce; or estimating from cases where the cattle in the house were not properly treated. But there is an old saying, and a true one, that, "It is by the head the cow gives the milk;" or, in other words, her milking qualities will be in proportion to her food and treatment. A cow well fed in the house will do better than one badly fed out; and one well fed in the field will beat another badly fed inside. There are certain seasons when the feeding will be of very different qualities in respect of milk and butter. We believe there is no better food for producing these than the natural grasses that spring up in dry ground in the months of May, June, July, and August. A cow pasturing upon these, and during this time, will beat a cow fed in the house on a worse description of food; but let the same description of grass be cut and given to the cow inside, she will milk equally well. The cow well fed on pasture may run a-head of the cow inside during the summer months, but in the autumn and winter the latter will catch and distance her competitor.

With regard to another opinion, that "Young cattle reared in the house, are never so hardy or valuable as the same description reared and pastured in the fields." There is more ground for this opinion than for any of the others, though it is formed in misconception. The fact seems to be, that they are equally good in their line. The house-reared cow is decidedly better for house-feeding afterwards, and more valuable than the cow reared at pasture; but by no means so useful or valuable if *sent out to pasture, and on a worse description of food than it has been used to*. It will go back, at least for a time, until it be inured to hardships, whereas, the poorly fed young animal, if brought into the house, will thrive rapidly, on better food and treatment. It is on this principle that, in both the animal and vegetable creation, we bring animals or plants from a poor to a rich soil. We seldom succeed in an opposite course. The Connaught man brought to Hampshire, will thrive and swell out amazingly on the pudding and bacon; but the Hampshire man in Connaught, will shrink and shrivel up on the *lumpers*.

There is one very important matter connected with this subject that ought not to be overlooked. In the animal creation, from man down, it is in early years that the physical powers and constitution are, in a great measure, formed, and placed on a sure foundation, or otherwise. The shapes and value of the cow and horse depend very much on the early feeding and attention. The breeder of the race horse, and the valuable short horned bull, looks to these points particularly during the first two years; and the farmer who house-feeds, having his young stock immediately under his eye, has a better opportunity of rearing a valuable class of animals, than he who allows his young cattle to take their chance outside in the fields. We have reared stock in the house, and of various breeds, and they have been always considered equal to, or better than the same class reared outside in other parts of the country.

When we speak of house-feeding, we mean that the cows shall get the principal part of their food in the house, but we by no means recommend that the cattle shall be tied up, like beasts in a menagerie. Our cattle are let out in a yard a couple of hours every day, and sometimes twice in summer. If we have a field of stubble grass, or of eddies, that will not cut with the scythe, we turn them out two or three hours to eat off the grass. On a large farm, we would always keep a field for the cattle to feed and exercise upon, at least a couple of hours in the day, and this would be a very convenient way of resting the land; we should take the fields in rotation. If following a six course shift, we would have seven fields, one more than the course, for the cattle. This field should lie under grass for this purpose until the end of the rotation, and on the seventh year it ought to be broken up and included in the next course, and another laid down in its stead, which should also lie during a course, and again be broken up, and a third laid down. So on till all should be rested in their turn, and broken up again.

We will now sum up, and point out a few of the many advantages to be derived from this new system

of farm management, which we hope in a short time to see carried out through the country.

And first, an increased number of cattle may be kept on every farm, as less than half the usual quantity of land in grass will support them.

Secondly, the abundance of manure which will always be made on the farm, will keep it in the highest condition, and produce luxuriant crops of every kind. A greater portion of the land will be available for cultivated crops, than on the pasture system.

Thirdly, more money will be made directly from the cattle, through the year, by their produce of various kinds.

When we have been urging these matters upon the landed interest, and farmers generally, we have been met by the common objection, "But how shall the poor farmer get all this stock? or the poor cottier that has no stock at all, get a cow?" The obvious answer to the first part of this objection is, if the farmer have a cow at all, let him rear his calves, and he will soon have stock. To the other part of the question, we would merely state what an honest neighbour of ours accomplished at one time—*he managed to turn a pig into a cow*. He saved 5s., went to market, and bought a sow pig; in twelve months she had a litter of ten, which in eight weeks brought in the market £6. With this sum, the same day, he purchased a young cow with calf, and she had a heifer, which he reared. In the mean time, the sow continued to breed as well as the cow, which produced him money and stock. His landlord gave him more land as his stock and capital increased. He is now a man of substance and respectability, with a well doing family, all provided for; and all this arose from the man's perseverance, and a sucking pig. We know a poor woman, whose cow died after calving; she reared the poor calf, without a drop of milk, upon *broth made from furze blossoms and hay*, thickened with a little oatmeal stirabout, and some boiled potatoes; in a few weeks it eat young grass and cabbages, it thrived well, and became an excellent cow. We would say, then, to those persons who want capital and means,



“Go thou and do likewise.” It is astonishing what a willing and active mind will accomplish, if fairly put to the test.

Agreeably with our former course on other subjects, we shall now go on and point out what we consider the best modes of house-feeding cattle, and in doing so, we shall not copy from or allude to any former directions published on the subject. Our knowledge is derived from close observation and experience of about fifteen years’ successful practice.

The first point we have to consider is, the house or byre in which the cattle are kept. Much of the success of the system will depend upon this; but as the great majority of our farmers have houses of this description which they must turn to the best account, not being able to erect new ones, we shall merely allude to a few indispensable requisites in such houses. If a farmer has the means and intention to build a new, or add to his former one, we should recommend the plan of the Glasnevin Model Farm cow house, which has already been published, and circulated extensively, or which can be seen at any time. This house, for convenience, comfort, and general utility exceeds anything we have ever seen or heard of. After six years’ experience, we could not suggest an alteration for the better. The principle, therefore, ought to be adopted in every case where practicable.

The cow-house must be *clean, airy, and comfortable*, not alone for the benefit of the cattle, but for the convenience of those who attend upon, feed, and milk them. There ought to be the means of extensive ventilation; at the same time, no direct currents of air coming in contact with the beasts. Open sheds, except in very sheltered situations, are inadmissible. There ought to be doors which could be closed in very bad weather to keep up an even temperature. No dung, urine, or foul litter ought to rest in the house more than a few hours, or until it can be conveniently removed, and always plenty of fresh litter supplied. The farm should produce enough of this for summer and winter consumption; in the summer and autumn the weeds, potato stalks, and

other refuse of the farm will materially assist the litter and make an abundance of fine dung. For the greater facility of keeping the cow-house clean, there ought to be a small door or open in the rear opposite the *groop* or passage where the dung and urine falls from the cattle, and communicating with the dung heap behind; the manure can be put out by this passage in a few minutes at any time and thrown on the dunghill. It is inconvenient, filthy, and tedious to be removing the dung in barrows or otherwise by the front door into the yard, where no dung should be collected or allowed to rest. It is of great importance that everything about the cow-house should be planned so as to render the work light and easy, it is only in such case that it will be properly performed.

The stands or stalls for the cattle is another subject which we must notice; for animals confined to the house, must be comfortable and at their ease; have room enough to move with freedom, to rise and lie down without difficulty, or interfering with each other; for this purpose, and for the facility of cleaning and settling the litter, each animal ought to have at least four feet, and this width will be sufficient for almost any cow. The length of the stand will be regulated in a great measure by the size of the animals, from five feet four inches to six feet will embrace all the usual sizes; five feet ten inches is a good average length. If it be too short, the animal will stand and lie uneasily, its hind feet in the *groop*; and if too long, it will void its dung and urine on the stand, lie upon it, and render it impossible to keep it clean. The stand must have a fall or inclination towards the *groop*, but with cows this ought to be very slight; they will not stand easy upon an inclined plane; about one and a half or two inches of fall in the whole length will be sufficient. A horse or bullock requires a fall in his stand to carry off the urine which would otherwise rest below him and keep his litter wet; but a cow which voids her urine otherwise has no occasion for such.

The materials and mode of forming the stand are also of considerable importance; cows confined to the house

rise and lie down frequently, ought to be able to do so with ease and without injury. Stands paved with round stones are the usual and perhaps the best for stables. The horse stands upon iron, he does not rest upon his knees either in lying down or rising; but the cow does so in both cases, and on prominent paving stones she will lacerate and swell her knees, and her feet will become tender, no litter will prevent this, she will become uneasy, fret, go off her feeding, lose condition and milk; therefore paving stones ought never to be used for a cow stand, nor any thing that is uneven or lumpy. Flat stones or flags will be much better, but bricks laid evenly will be better still; it is bricks we have in our cow-house, and they suit the purpose well. A good well-made earthen floor under the forelegs or knees, we would prefer to any harder substance; but there is one objection, there is no keeping it in shape; the constant trampling on certain parts wears it into heights and hollows, and spoils it. But of all materials timber is the best—a boarded floor under the feet and knees of the cattle, extending about half way down the stand, the remainder made with flags or flat stones; any coarse timber cut in lengths and placed on end, or laid on the side, will do if it be level, and evenly above. When watching the operation of street paving with wood in London, it struck us as the best possible thing for the stand of a cow-house.

#### MODE OF CONFINING THE CATTLE.

The next matter we have to consider is the best plan of confining the cows to their stands. It will be obvious that the mode by which the animal will have the greater liberty of rising and lying down, and of standing or moving at her ease, will be the best; due regard being had to her own safety and that of her neighbours.

Bales formed in a variety of ways, have hitherto been the most common method of confining cows when in the house, but they are by no means calculated for house-feeding; in them the animal is too much confined, cramped as it were in a vice, and cannot rest com-

fortably; they may do well enough where cows are merely brought in to be milked and turned out again, but not otherwise.

The most permanent, cheap, safe, convenient, and consequently the best mode of confining, is by a chain round the neck, with a hook and a couple of others from the under part of it, to hooks made fast on each side of the stand or feeding troughs, by which the chains may be lengthened or shortened at pleasure. By this mode they have the greatest liberty to rise, lie down, move about, and stand or lie at their ease, and they cannot by possibility injure themselves, or the cows on each side of them. Our cattle at the Model Farm have been always confined in this way, and we have not had a single accident in consequence.

#### FEEDING TROUGHS AND PASSAGES.

Conveniences for feeding the cattle, both in regard of the troughs that are to hold the food, and facilities for getting at them, is of great importance, especially as the operation has to be performed so frequently during the day.

If the cattle are so placed, that the cow-man must pass up between each two cows, and feed them separately, there will be a great deal of lost time and extra work. Besides, the cows that are last of feeding will be turbulent and fretful. The old and most common mode of placing the cattle along a wall, with the troughs before them and close to it, is therefore quite erroneous, and leads to the loss of time and inconveniences mentioned. In all such houses there ought to be a passage before the cattle, by which their meat and drink can be given; and for this purpose the house should be so arranged, that the cattle will stand *across* it, rather than lengthwise, the different parties head to head, with the feeding passage between them. With the least possible time and trouble they can be fed on each side; and more cattle will stand in the same space by this arrangement. A house sixteen feet wide in the clear, and

twenty-seven feet long, will accommodate eight cows, giving them quite sufficient room in all respects.

The feeding passage is to be entered by a separate door, and to be four feet wide, for the convenience of introducing a hand-cart or wide barrow. On each side of this will be a brick or light stone wall, with a strong plank or beam of wood to keep it firm, and built in the wall on each side—the whole height about thirty inches,—the feeding-troughs to be placed between this wall and the cows, and may be formed of flags, of wood, or of brickwork, according to taste or convenience. But there must be a strong beam of wood, well bolted down in front of the troughs next the cows, to which the hooks and chains that fasten them are to be attached. The division between the troughs must also be firm, otherwise the cows will soon demolish them; and a passage for water through all, and to the outside of the house, for the convenience of washing them out, which must be done repeatedly whenever dirt accumulates. The cow-stands, group, and passage behind ought to be scrubbed out and washed, at least once a-fortnight.

Our feeding-troughs at Glassnevin are of Carlow flags, fastened by timber and cement. They are three feet ten inches long, thirteen inches wide at bottom, and twenty inches at top. The flags are more permanent, and easily kept clean, than any other material.

#### MODE OF TREATING CATTLE.

A great deal of the success of house-feeding depends upon the manner in which the cattle are treated, independent of their meat and drink. Their general health and produce will be increased or diminished considerably, according to the attention that is paid in this respect. A cow that has been used in the house, and coming so frequently in contact with the human race, will be a great deal more docile and domestic than one reared in a comparatively wild state in the fields, that is, if the former has been treated with kindness and humanity; but though very sensible and grateful for kindness, she will not be bullied, beaten, or forced into

any measure. Harshness and bad treatment will only confirm and multiply her vices. She must be treated in a different way, coaxed, petted, and kindly managed. This course will seldom fail to eradicate even an inveterate habit. A bad tempered, harsh, ignorant cowman, will do an immense injury among a stock of cattle. They are liable to injuries from blows and bad usage; he renders them wicked and unmanageable, when milking or otherwise handling; and as they have the power of withholding their milk when irritated or fretted, the quantity will be short; and repetitions of this pernicious habit will put them dry altogether.

When our pupils were first put to brush and clean the cows twice in the day, there certainly was not a very kind feeling manifested on either side by the parties; and notwithstanding all the advice and cautions given, there was a mutual wrangling, and alternate *scraping of shins*; but the dispute always ended in the triumph of the *brute*. By and by this evil cured itself. The lads found it convenient to come to terms, and a cessation of hostilities ensued, which has been most advantageous to the belligerents. The animals are now gently and carefully brushed and cleaned, for which they are very grateful, and reciprocate the kindness by quietness and docility.

A cow should never be raised by a kick from the foot or a blow from the pail, or put to one side by a stroke from the fork. We have known cattle to kick back at the fork, and injure themselves seriously, the prongs entering their legs or feet. If they be spoken to properly, they will obey readily. Cattle soon come to understand the few words which it is necessary to use, in order to command them. They ought to be curried, brushed, and rubbed all over with a wisp of hay or straw, at least twice in the day, morning and evening, and if possible, in the middle of the day. It ought to be well done, beginning at the nose, and ending at the tail, not forgetting the limbs. This is nearly as necessary to the health and condition of a house-fed cow as food and drink. It renders them easy and comfortable, and keeps them in a thriving state. If this be

neglected, they will be restless and uneasy, show a disposition to scratch themselves against each other, and every thing that comes in their way, a scurf will form upon their skin, their hair will come off in patches, their general appearance be unthrifty, and the loss of milk and flesh will show something wrong.

The general health of the animals must be narrowly watched, and especially the state of the bowels. If any thing goes astray in that direction, it may in general be easily remedied by change of food. If the bowels are relaxed, some dry feeds of chopped straw, hay, &c., will restore them. In the spring and early summer this will more frequently occur from young and succulent food; the withholding of such for a few days will effect a cure. If the excrement be hard and the bowels constipated, a contrary food must be given to relax them. Bran mashes are by far the best for this, as well as many other diseases. Nothing will restore the health and condition of a cow, or produce a change for the better in the system, so much as bran mashes. If the food and treatment of the cattle be watched and regulated correctly, the owner will seldom be troubled with their diseases, or require the veterinary surgeon. If cattle in the house become ill, it is at once discovered, as they refuse their food and fail in their milk. The symptoms will in a short time point out to the skilful practitioner the nature of the disease and the remedies; but the farmer ought to be very cautious in drugging his cattle. If a cow goes off her feed, she ought to be allowed to remain so; no food ought to be offered or given until she shows a strong disposition for it, and then only in small quantities at a time, in the form of bran mashes, decoction of flax-seed, or some such digestible or restorative food. Hunger itself will often starve out a disease, when drugging and pampering would render it fatal.

About the time of calving the cows ought to be strictly watched and well attended. If they are poor and weakly they ought to get nourishing and stimulating food. If they are in high condition, a week or ten days before calving, they ought to be bled, let

four or five quarts be taken ; and get a dose of purgative medicine—1 lb. of Epsom salts, dissolved in a quart or more of water. This will prevent inflammatory fevers and other complaints about the time of parturition. They ought also to be fed sparingly a few days before and after calving, on bran mashes and sweet hay, until the stomach has recovered its tone. It almost always happens that the cow's udder swells much at that time—often to seriously inconvenience her ; she feels pained and feverish. This state remains wholly, or partially, perhaps, confined to one quarter of the udder, for a considerable time, if not relieved. She not unfrequently loses the use of one or more spins, or quarters of the udder, and this materially reduces her value as a milch cow. In such cases there ought to be no time lost in reducing the swelling and bringing the udder to its natural state. The most effectual remedies are, milking clean ; frequently during the day and night rubbing the udder well with the hand ; fomenting or stuping three or four times in the twenty-four hours with hot water and a flannel cloth ; and when the udder is dry, *rubbing in well* a small quantity of marsh-mallows ointment. If this course be carefully pursued, the most obstinate case will yield to the treatment in three or four days.

The person in charge of cattle ought to have a strict and watchful eye at all times, particularly when they are fed upon turnips, potatoes, steamed food, or green herbage—such as clover, to see if they swell or choke. The symptoms of these need not be described. If the animal have got any large substance in her throat or œsophagus, the first point to ascertain is its situation ; whether it is high up towards the mouth or low down near the chest. The animal's head ought to be stretched out, and a skilful person run his fingers down the outside along the course of the gullet on both sides of the neck ; the course of the œsophagus or gullet is immediately behind the windpipe ; therefore in the hollow between the windpipe and the solid part of the neck, the obstructing body will be found. If it be in the upper part towards the head, it is probably large, and could not



be put down safely; an effort, therefore, must be made to get it returned back into the mouth; and for this purpose the nose and head must be again stretched out, and a skilful, handy person will commence with his fingers on each side of the gullet immediately below the substance—potato, &c.—and endeavour to move or press it upwards. He must do this cautiously and perseveringly, for if he use much force or violence he will do more harm than good. And if the substance remain long in one situation, the œsophagus will swell and enclose it, so that no force will extricate it. If it be not far down every effort should be made to get it up. We have seen potatoes and pieces of turnip frequently brought up by a person introducing a small hand and arm; the cow's mouth being cautiously kept open. It is done by introducing the hand over the tongue and into the gullet, seizing the substance, and bringing it up. The operation, if practicable, can be performed in less than a minute.

If the substance be low and cannot be brought up, it must, if possible, be put down; and the best instrument for this purpose is the *probang*, which is now very common. Every farmer should be provided with one—at least, every neighbourhood. It is made of leather or cane, with a spiral tube of wire in the centre; a cup fixed at one end, and a hollow perforated ball at the other. There is a piece of wood with a circular hole to let the probang pass. This is put into the mouth to keep the jaws open, and strapped round the head. Previous to the probang being used, about half a pint of linseed, train, or other oil should be gently poured down the animal's throat. This protects the œsophagus during the operation, which it very much facilitates. The mouthpiece is then fastened on; the cow's head held forward, and the neck stretched; the probang being first oiled or soaped, the cup end is introduced into the gullet until it meets the obstructions. It has now to be managed cautiously. If the substance does not give way easily it must be hit gently, so as to cause a slight concussion, which will in a short time set it in motion; and it will go down readily into the stomach.

If it be thrust down rashly or forcibly, it will either pass through the œsophagus or force the potato through and kill the animal. There have been several substitutes used for the probang—such as rods, whip shafts, &c.; but all such are dangerous, and ought not to be tried. The best substitute, and one that may be readily obtained, is about five and a half feet of a stiff new rope, about two and a half inches in circumference, lapped at one extremity by a small cord to within half an inch of the end; the strands of this last half inch to be loosed out, which will form a soft elastic surface a little wider than the rope itself. This rope, so prepared and greased well all over, may be introduced, and will suit all the purposes of the probang.

When an animal is swollen, or hoven, as it is termed, the cause is fermentation of the food in the paunch, or first stomach, and the production of gases—chiefly carbonic acid. This state is produced by a large quantity of certain kinds of food being greedily swallowed without due mastication. Of the green food, clover is the most likely to produce swelling; and in the winter, potatoes, raw or even steamed, will produce the same effects if given injudiciously; but none of them will do so if given cautiously and in small or moderate quantity. This shows the propriety of feeding often and little at a time, rather than giving large masses of food at once. The careless and lazy cowman will give a large quantity and seldom, if he be suffered to do so. If the same description of food is given repeatedly it may very likely produce swelling—such as clover after clover, or potatoes or turnips after potatoes; but this ought never to be done. Alternate feeds of dry and soft food ought always be given, summer and winter.

From whatever cause hoven proceeds, it is easily remedied if taken in time; if it is not, no remedy will be effectual—the animal will choke. The distended stomach pressing against the midriff and lungs stops the the breathing. If the beast is noticed in time, so that it can safely swallow a fluid, the best of all remedies for a full grown animal is a naggin of the spirits of turpentine, mixed in a pint of oil; any of the common oils—castor,

linseed, sweet, or train oil. This poured into the stomach, washed down with a pint of water. The quantity to be varied according to the age and strength of the animal: a year old about half the prescribed quantity. This medicine will immediately stop the fermentation, and the gaseous matter will escape by the gullet; afterwards the turpentine and oil will produce a purgative effect, and carry off the offensive matter from the stomach. A purge is necessary afterwards, no matter what means may have been used to reduce the swelling, for the fermented mass will otherwise remain and produce disease in the stomachs and bowels.

There have been a variety of modes and prescriptions recommended; but the above we would strongly recommend from long experience. We have not known a single instance of failure, where properly applied and in time; and we have in numerous instances witnessed its beneficial effects. It would be well, therefore, for every proprietor of cattle to have some of these ingredients at hand. The probang also has been successfully used in relieving hoven; it is calculated to do so from the hollow perforated ball and the tube which passes through it. In relieving the swollen animal, it is passed down (the ball end foremost) the gullet and into the stomach; the gases immediately pass through the ball and tube, and out at the other end. But it merely allows the gas to escape; it will not stop the fermentation; it has to be frequently passed before the fermentation ceases, and is, therefore, by no means so safe and efficacious a remedy as the former.

The last, and which is to be used only in extreme cases—where the animal is so swollen that nothing can be safely put down the throat, and to give life a chance, *paunching* or stabbing must be resorted to. This is opening a passage through the skin of the flank, into the paunch, and allowing the foul air to pass out, and allay the swelling. This operation, when carefully performed, is generally successful. The open must be made on the left side, reckoning from the hind part of the animal, about seven inches from the loin bone towards the shoulder, and meeting a line at right angles

between the backbone, loin, and first rib, will show nearly the spot. There has been an instrument lately invented for the performance of this operation, which every farmer, or at least every neighbourhood, ought to be provided with; it is on the principle of the *trocar*. It is a stiletto in a sheath, and is plunged into the stomach from the outside; the stiletto is withdrawn, and the sheath remains, a tube by which the foul air escapes, and the animal is relieved. When the fermentation ceases, and the gas is gone, the opening in the side may be stitched, or a common plaster put upon it, to keep out the air. It will soon heal, and the cut in the stomach will also heal safely; but the animal must be purged and fed very sparingly for a considerable time. The operation may be performed by a pen knife and a tube of tin, or any other material. The chief point is, to take care that none of the contents of the stomach shall pass in between the skin and the stomach into the cavity of the abdomen; if any solid or liquid matter get in there the animal will die.

#### THE MILKING PROCESS.

The treatment in regard to milking, is the next matter for consideration, and this requires more attention than is generally paid to it. It ought to be done well and regularly, and every portion of the milk brought away at each time. Cows are docile and social, they have always some favourite, which they prefer to any other person, and to whom they will give their milk with freedom. They will not be satisfied with strangers or awkward persons, who are bad milkers. The regular milkman or maid, therefore, ought always to perform the work, otherwise there will be a falling off in the produce. Besides a bad milker, a bad temper will spoil the cattle. There ought to be regular hours observed in milking, and the twenty-four be fairly divided. The hours of milking at Glassnevin are, six in the morning, and six in the evening; this divides the time regularly, and we have always found it to answer well. Some prefer milking three times a day, and when cattle are in the house, this would not

be troublesome or inconvenient, except for the fair division of time. When cows are newly calved, and the udder swelled, they ought to be milked frequently, and at all times and seasons, the last drop ought to be taken; if any is left in the udder, it is not alone the loss of the milk, but the cow is injured. Such a course will eventually put her dry. The last of the milk is always the best. If any doubt exists about the honesty or skill of the milker, the farmer, or his wife, or some confidential person, ought to examine the cows, and find out if they are all stripped clean.

In regard to cleanliness about milking cattle, to which too little attention is paid, and which deserves more than is generally imagined, we shall submit a few observations. There are certain filthy habits and practices, which are unnoticed because they are so common that people become habituated to them, and which, if narrowly looked into, would appear disgusting in the extreme. We find in the morning the milkmaid or milkman rise from bed, and go to the cow-house with unwashed hands; the state of the pail itself is questionable. They rise the cow out of the dung and urine, the udder and teats smeared with these, they sit down under her without ceremony, and commence to milk. The dirt comes away along with the milk, and disappears in the pail; a portion adheres to, and shows itself on the hands, and among the fingers; but the teats are hard and stiff with the dirt, and the milk will not come away freely. To remedy this, the fingers are dipped into the milk in the pail, and a portion brought up to soften the mass above. The milk and all runs more freely back into the pail. But the cow's udder must be rubbed all over by the hand, to induce her to give the last of her milk, and the loose hair, scurf, and other matters are again deposited along with the former dirt. By the time the cow is milked, the teats are washed down, and the fingers partially so, into the pail, and in the milk there is a high per centage of filth, which will certainly make but indifferent butter. We hear a great deal about clean dairies, but first we ought to have clean cow-houses and clean milkers. The dairy boys of Dublin are very filthy in their habits. If they use

water at all, it is for an unmistakeable purpose, and not for washing their hands, or the cow's udder. In addition to the dirt at milking, they plant themselves upon the milk kegs, and ride into town. The ladies of the city can have no conception of the medley of materials they swallow every day in cream to their tea.

But all this uncleanness may be avoided, and by very little trouble. In the morning, the cows ought to be first cleaned perfectly, before milking, particularly the belly and udder; the milker ought always to have a bucket of water and a sponge, or woollen cloth, at hand. He ought to first wash his hands, and then with the sponge or cloth clean the teats and udder of the cow; then it will be soft and supple, and the milk will run away freely and clean. And during the process of milking, he ought to wash his hands occasionally; the milk and butter will then be clean and sweet.

A very absurd custom prevails through the greater part of Ireland,—of allowing or teaching nothing but females to milk. This is decidedly wrong; for men, when taught, are by far the best milkers—they are strong, and have more command over the cattle. One good man is in general equal to two women. Men who are good milkers obtain ready employment, and good wages, in the vicinity of Dublin.

#### MODE OF FEEDING.

The health, condition, and value of cattle are regulated more by their treatment in regard of food, than all other causes besides. This is the case in every situation in which they may be placed, but particularly in the house; it is, therefore, on the mode of feeding principally, that the success of the system will depend. There are a few leading principles, in regard to cattle and their food, which ought always to be borne in mind, and which will be a kind of index to regulate the details of management in this particular. By close observation it will be found, that cattle, though living upon a comparatively coarse food, and of a different kind from the human race, are very similar in their

tastes, appetites, inclinations, &c. For instance, it will be found that any particular kind of food, no matter how grateful to the animal in the first instance, if it be constant, long continued, without a change, will cloy upon the appetite; she will tire of and refuse it, unless stimulated by hunger. Again, it will be found that, like the epicure, she will gorge herself on different dishes; though satisfied with one kind of food, she will immediately fall upon another, and a third, if it be offered—and so on, until she is crammed, and ready to burst. But if a large quantity of food be placed before her, no matter how good, or how fond she may be of it, the abundance seems to satiate her appetite, and she will not eat so much as if a smaller quantity had been offered; and if the refuse be left before her, or offered at a future time, it will disgust her—she will refuse it. But if the quantity offered of the same food, be under the appetite—be less than would fill or satiate hers, she will eat this small quantity again and again, without refusal. Individual cattle, like individuals of the human species, have certain measures of appetite; what will be enough of food for one, will be altogether insufficient for another; they have likewise their capricious and unsteady tastes, and choice of particular food. Now these facts will at once suggest a correct and efficient mode of house-feeding; and a system by which the owner or feeder of cattle will be able to meet all circumstances successfully, and keep his stock in health and condition.

And first, he must not keep a beast confined too long to one particular kind of food, no matter how good it may be.

Secondly, he must alternate the food, if possible; every meal different from the former one.

Thirdly, he ought not to give a large quantity of any particular food at one time; nor allow any refuse to remain before the animal after it is satisfied; nor offer the refuse to the same animal again. Immediately after feeding, the troughs are to be cleaned out, all dirt taken away, and nothing suffered to lie before them between feeds.

Fourthly, that he must feed often, and give little at a time—keep the animals rather greedy than otherwise; and, should any individual refuse its feed, the food must be immediately removed, and none offered again until it be hungry and anxious for it.

Fifthly, and what requires some skill, the feeder must find out and ascertain the peculiar appetite and taste of each animal; the quantity and quality of food that is grateful and necessary—indulge it with this, but no more.

Sixthly, the food of all kinds ought to be kept and given very clean. The cow is endued with a peculiarly fine sense of smell, and will refuse any kind of food that has got the smell of flesh, or any decomposing animal or vegetable substance; therefore pigs, dogs, poultry, &c., ought to be strictly kept from the food, and no bucket or other vessel ought to be used for their drink or steamed food, that has been employed in the feeding of pigs, or at other dirty work.

Seventhly, cattle in the house, particularly milch cows and young stock, ought to get plenty of water twice a day in the house, besides in the yard or field, when turned out to exercise. A small portion of bean, pea, or oatmeal, or a compound, mixed in the water, and given to the milch and fattening cattle, will materially improve their condition and milking properties.

Lastly, it may be laid down as an axiom, that good food and plenty of it is the cheaper and more profitable mode of keeping all kinds of stock; and that starvation and bad food is always bad economy.

To illustrate the foregoing, and close our observations on this subject, we shall detail our mode of feeding at Glasnevin—a mode suggested and improved by fifteen years' experience.

We must first observe, that we give six separate feeds in the day, summer and winter; commencing at six in the morning, and ending at half-past eight in the evening. We divide this time into six parts; the first feed at six, the second at eight, the third at twelve, the fourth at three, the fifth at five, and the sixth and last at half past eight.

The usual food, in the summer, is the following:



Italian rye-grass and clover, cabbages, vetches, mangel wurzel leaves, and rape. Of these we give alternate feeds, never two of the same kind in succession, if it can be avoided; and, if the state of the bowels require it, we give a feed of dry hay occasionally.

In winter, the food is cabbages, turnips, mangel wurzel, steamed or boiled food, cut straw and hay, with hay alone. We alternate a dry feed of cut straw and hay, or hay alone, with a soft feed, such as steamed food, turnips, mangel wurzel, &c. &c.; and sometimes, if the straw be good, we give one feed of it in the day instead of hay. Twice in the day, at ten in the forenoon and half-past four in the afternoon, we give a drink of meal and water, or water alone. We use bran frequently, both summer and winter; it is our chief medicine. If a cow be delicate about calving, or other times, it soon restores her; it is excellent for milk, and will at any time pay for itself. This constitutes the food of the cattle through the year.

The system has been entirely successful with us, and, if carried out correctly, will be productive of the greatest benefit to the country. The produce of the cattle, both in money and manure, will be greater than by any other method at present known or practised.

There is a barbarous practice followed in Scotland; in some parts of England, and the Scotch stewards have, in many instances, introduced it into this country. It is, confining store cattle and others in what are called straw yards—enclosures with open sheds around, in which turnips, hay, and other such food can be given; but they principally subsist upon straw, which is thrown down among their feet. Here are the poor animals, in all seasons and weathers, champing; over the knees in their own excrement and other filth, and eating their miserable food off a dung heap. This practice is followed where the farmer cultivates upon the old grain crop system; they have few cattle and little manure, and, having a great quantity of straw, they take this method of treading it down for dung. We hope that humanity and sound policy will do away with such an absurd and abominable system.

## CHAPTER XIV.

THE EIGHTH ERROR.—THE KEEPING TOO MANY HORSES,  
PARTICULARLY ON SMALL FARMS.

THE small farmers of Ireland have always been a bye-word for bad management and poverty; and few of their erroneous practices have tended more to bring on such a state of things than the keep of horses upon their small holdings.

We have before pointed out, how the English and Scotch farmers obtain such an advantage over us in regard to the numerous ditches that we keep up; we shall presently show that they have still greater advantages in respect to the keep of horses.

We may call the average size of farms in England 500 acres; but any number will hold good in the estimate we are about to make. We may say that ten acres is an average of the small horse farms of Ireland. Now the regular quantity of horses on an English farm is five to each 100 acres, or twenty-five to the 500 acres. But there is one horse on every ten acres in Ireland, or fifty horses on 500, just double the quantity that is in England; or twenty-five horses additional are used to labour the same quantity of land. Presently we shall show, that the lowest estimate for the keep of a horse in the year is £20; therefore the twenty-five extra horses, at £20 each, will amount to the sum of £500, exactly £1 per acre on the Irish 500 acres—which the Englishman saves and the Irishman pays. But the matter must not rest here; let us count smith work, harness, cart, plough, harrow, &c., the tear and wear of all these, and of the horse too, and a moderate sum for meat and wages for a man to attend and work the horse, we will be under the mark when we estimate this at £20 per annum more. Now this will show the Irishman that, by his own folly and mismanagement, he pays £2 per acre more than he ought to do, and more than the English farmer pays. This enables the extensive farmer to pay a high rent

and be rich, and the Irish farmer a low rent and be poor. We have not taken into account the number of labourers thrown out of employment in every Irish neighbourhood by these twenty-five horses, and the number of families reared in sloth and indolence, in consequence of having the horses to work for them.

But it may be asked, is there no remedy for this? Or can no means be devised by which the small farmer may be brought more upon an equality with his more extensive neighbour? We consider there are simple and obvious means of doing so; *let him sell his horse and trappings, and purchase cows.* Let him part with the plough and cart and employ the spade and barrow; and by these simple means, he completely turns the tables upon the extensive farmer. For besides the twenty-five extra horses that the small farmers maintain on the five hundred acres, they may part with the *remaining twenty-five*, which will save £500 per year more, or £1 per acre less than the extensive farmer *must pay*, for he requires the latter quantity still, and the small farmer may replace every horse with a couple of cows, which will bring him in the sum of £40 per annum, an income equal to the expenditure caused by the horse, and which on the five hundred acres will amount to £2000, and this a clear sum beyond what the extensive farmer can accomplish; besides the employment given in the families and neighbourhood, and the extra quantity of produce raised and saved for the community. In our mind this settles the long controversy between large and small farms. The latter properly managed are decidedly the best for all parties, the proprietor, the occupier, and the commonwealth; badly managed, they are by far the worst. Therefore, we say, change not the farms, but the people; educate them, give them sufficient knowledge to manage their small farms, and all will be well.

We may now estimate and show the effects of horses kept on farms not so dissimilar in point of size, and more common in this country. A twenty acre farm is very common, and on which we will find at least two horses, as it cannot be conveniently laboured by one.

Now the keep alone of these two horses, not to speak of other charges, will be £40 per annum, or £2 per acre on the land. But the two horses will labour forty acres equally well, and the annual charges for horses upon it will be only £1 per acre, so that there is a more moderate rent upon the forty acres than the twenty, in consequence of the keep of the horses upon the small farm.

We will go lower still, and show that the case is absolutely ruinous on smaller farms. We will take eight acres, on which we will generally find a horse, a cow, a pig, &c.; but according to the improved system, there ought to be on this farm four cows, or to remove all cause of cavil, we will take two cows instead of the horse. The loss by the horse's keep alone will be £20 per year, or £2 10s. per acre, but the gain by the two cows' produce would be £40; these two sums added, make £60, or £7 10s. per acre, on the whole farm of loss, by the presence of the horse, and the absence of the cows.

But we are met by the following objections,—How is the land to be laboured? How is the firing to be got home? How is the produce to be taken to market, the manure drawn out and the grain drawn in? And, that sometimes the horse makes money at out work, or on the public roads. To the first of these questions we would answer,—the labour can be much better done by the farmer and his family, or with the occasional assistance of a labourer. The food of a horse alone will cost nearly £5 more than a labourer working through the year at 1s. per day. The man that goes at the head of the horse and attends him, working the same time carefully on the farm with the fork and spade, will do much more and better work without him. And how is the land usually laboured with the plough? Merely scratched, and a few inches of the surface turned over. Let the labour of the small farm commence early by the spade, go on regularly during the autumn and winter; in the early spring the ground will be ready for the crops, which can be put in with facility and neatness, and the harvest will show the superiority of the spade over horse labour.

With regard to work which must be done in connexion with every small farm, such as drawing fuel, produce to market, grain out of the fields, manure, &c., it will be said, if all small farmers were to sell their horses, how shall this be done? Our answer is, we fear that for a considerable time there will be fools and horses enough in every neighbourhood to do such work; but if all were to act wisely in a neighbourhood of small farms it might be prudent, and profitable for individuals to keep horses merely for the purpose of doing such work on hire. This is the case in towns, and in the neighbourhood of public works, but for every small farmer to keep a horse merely to do his own work, is entirely out of the question. He does not consider that the animal is eating while he is sleeping, and working or idle it must be fed, besides the trouble and anxiety it must create; the safety, the feeding, the danger of losing him altogether, by accident or old age; he must be a positive loss in the end. The old cow may be fattened and sold to the butcher, or at the calving; not so the old horse, he must be sold at a deteriorated price, or to the carrion butcher for the price of his skin. Many a poor struggling farmer is broken down by the loss of his horse. As to money made by the small farmer and his horse, jobbing or working on the public roads, such is dearly earned indeed; it is always miserable wages, and the farmer is turned into a carter or carman. He neglects his land, and his crops, he loses more in that way than he gains in the other; even if such gains were summed up, they would not, at the end of the year, pay for the meat and wages of the person who takes care of, and drives the horse.

The horse does incalculable injury to the farmer, diverting him off his regular business, and dividing his attention. If he is at all inclined to be indolent, he has an admirable excuse in the horse. If the morning be gloomy, cold, or frosty, there is a shoe loose or a nail required; he must repair to the smithy, he generally meets there a few social friends, there is an ale-house in the neighbourhood, and Vulcan is always thirsty—there must be a join, or a treat, and besides the loss of time,

there is a loss of money. Martin Doyle has humorously and faithfully pointed out the excursions to markets, fairs, and funerals, and their consequences.

We have before estimated the annual keep of a horse at £20, and this we consider very low. From careful inquiries, and from various sources, we find the amount in every case greater than the sum mentioned. In England and Scotland, on the most economical plan of feeding, the sum varies from £25 to £30 per year, but from actual experience, and the nicest calculations of the quantity and value of the several kinds of food, we find that no horse can be kept in working order for less than the sum estimated. The farmer will be astonished, and say this is a great deal of money; and he cannot conceive how such a sum could slip through his fingers unobserved, and this is one of the greatest neglects on the part of such people, that they keep no regular accounts of their farming transactions, the quantity and value of their crops, their income and expenditures, &c. If, like the merchant, they were regular in these matters, it would tend to correct a vast number of the errors into which they unwittingly fall.

We have also stated that the horse displaces two cows on the farm. We do not mean to say that the horse will exactly eat as much as two cows; but the extra quantity of manure from the cattle raises a sufficient quantity of food on the following year to feed themselves.

Where the cow and the horse are kept on the same farm, the latter is always the favourite, gets the best of the food, and the cow is half starved on the refuse. It not unfrequently happens, that the horse eats the oatmeal that ought to be made into stirabout for the family. In fact, he consumes the greater portion of the produce of the small farm, without making any adequate return.

When an Irishman obtains a bit of land, his great anxiety is, not so much what is the quality, rich or poor, the state of its former cultivation, or the accommodation of housing, not even the rent—that is comparatively unimportant. The great point is, how shall he get a horse? for the idea of a farm and a horse is inse-

parable. If he has a trifle of money, he lays it, or the greater part, out upon this indispensable adjunct of a Hibernian establishment. If he has not money, he will beg or borrow for this purpose, and involve himself in difficulties. The horse must, in general, be a cheap one, and of course an old and indifferent one. But when he has his horse and halter, he must have more; he must have harness, cart or car, plough, harrow, &c. &c., and the cost of these, when summed up, may be double the price of the horse; and thus he commences to labour a piece of waste, or wet, dirty, exhausted land. And what prospect has he to repay all this outlay from such a source? The finale may be easily guessed at—bad crops, arrears of rent. In a very few years he removes a bankrupt, or sits without paying rent at all.

Had he commenced on a different system, his case would have been altogether different. Had he purchased cows, even young cattle, (heifers at a low price,) with a few necessary implements for spade cultivation, the cattle would have been easily kept, always improving in value, making manure, and when in milk making money. The calves reared would have increased the stock, some of which might have been sold to pay off incumbrances or rent. The other advantages, the superiority of spade labour and the abundance of manure, would soon have brought his farm to the state of a garden. The facts we have been stating require no further proof than a view of the small farms, and the poverty and misery of the holders.

Though we deprecate the use and application of horses to small farms, we are by no means an enemy to that noble animal. They are excellent where required, and indispensable on extensive farms. It is unnecessary that we should say anything regarding their habits and treatment. Many excellent works have been written upon the subject, which the owners of horses may consult. The horse has not, like the cow, been neglected; he has, at all times and in all countries, been a special favourite with the human race.

## CHAPTER XV.

THE NINTH ERROR.—THE NOT COLLECTING AND APPLYING  
A SUFFICIENCY OF MANURE.

THIS subject is intimately connected with others which we have before discussed, green cropping and house-feeding, and forms with them a most important ingredient in every system of successful farming. No economy, no superior management, no scientific or practical knowledge, no system yet discovered or likely to be discovered, will supersede the necessity for a liberal and constant supply of manure to our land. It ought to be, therefore, a chief object with every farmer how he shall best collect the greatest quantity of the best quality, and apply it in the most judicious manner. That a great deal of error and misconception prevail on this subject is quite evident, not among our Irish farmers alone, but those of every part of the United Kingdom. The chief cause of the poverty and embarrassment of farmers is, the want of sufficient manure and the low condition of their land. Much may be done by draining, deepening, and otherwise improving the soil. A permanent improvement, however, if well done, will serve for a number of years, a lifetime, or a century; but it is not so with manure; a constant supply is absolutely necessary to keep up fertility; and in proportion as this is dealt out, liberally or otherwise, will land of every description make an ample or scanty return. Much may be accomplished by superior management and cultivation; but abundant crops will always depend upon the supply of manure. It is singular that, at this time of day, such difference of opinion and different practices should prevail, even in the best cultivated districts, on a subject that we should suppose every farmer ought to be intimate with, and some recognised principle established; at a time, too, when agricultural improvement and knowledge are making such rapid



progress, and finding their way into every part of the country, we should suppose this vital question, the collection and management of manure, would be prominent, first discussed, and best understood; but we do not find such to be the case. There is a lamentable ignorance, a culpable neglect, and erroneous practices, prevailing among the great majority of our farmers on the subject. The rapid progress of chemical science of late, has been of great importance in expanding our views, and giving us correct ideas of the nature, properties, and operation of manures; and on this subject we prove the truths of science by correct practice. At the same time that we are prepared to admit the great importance of science on this, as on other matters connected with agriculture, yet it appears our extreme views and anticipations have been rather disappointed, and serious loss has occurred to individuals in consequence. No sooner was it known that certain new and foreign substances, such as guano and nitrate of soda, were highly fertilizing, portable, and comparatively cheap, than a new and plausible idea was started, that as chemists could analyse them, could ascertain their proximate and ultimate principles, they might easily combine these principles synthetically, and produce similar substances of precisely the same nature, having the same effects on the soil and crops. Nothing could be more plausible than this; speculation was rife, the laboratories were put in requisition, companies were formed, and fortunes were to be made in the shortest possible time. Farmers were equally elated and sanguine; but we must confess, that our anticipations have in a great measure failed, and that hitherto these artificial chemical manures have not come up to our expectations. Under these circumstances, and according to present appearances, our only resource is, to fall back upon the *old fashioned manure* from the farm yard. This, we presume, will not disappoint us; this will suit every crop and every soil. But it is urged, that though the best manure, dung is only attainable in limited quantity; that the extensive farmers of the United Kingdom, especially those who live at great distances from towns, are unable to obtain a sufficiency for all their

crops, and must therefore look to other means of supplying the deficiency. But, with all our respect for these extensive farmers, we are constrained to think that they are following a very objectionable system, which causes the scarcity of manure, and the poverty of their land; that so long as they follow the grain crop system and pasturage so extensively, with comparatively few cattle upon their land, it will be poor; and in order to produce even moderate crops, they must always be at the market, and expend money on extraneous manures. Were they merely to change their system, increase the quantity of their cattle, feed them in the house, and preserve their manure, every farmer would have abundance of manure for all his purposes; every farm of every size would maintain itself in high condition without any extraneous or foreign aid, and without the outlay of capital. This system would equalize the value of lands, as manure would not have to be purchased and carted from towns. But the manure, when made by the cattle, requires considerable attention and skill both in its preservation and application.

The old, and we fear we may say, in many cases, the present system of managing and collecting manure, was to commence at November, when the cattle and horses were housed, to throw out the dung generally before the door, and leave it exposed to the weather during the winter months, washed by the rain and bleached by the atmosphere, the liquid finding its way into the nearest gripe or water course. In spring it was drawn out and applied chiefly to the potato crop, and stretched over as large a space of ground as possible. Afterwards what was considered an improved mode was adopted by some; the dung was carted out to the fields at intervals, and mixed with cold heavy earth, mostly in sufficient quantity to prevent the putrefactive process; this was turned over in large masses, without sufficient mixing or breaking, once or perhaps twice; and it not unfrequently happened that quick lime was mixed in the heap; and in all cases, there was a total disregard of the liquid manure, the drainings from cow-house, stable, scullery, pig-houses, &c., were all allowed to

evaporate or run to waste. Another, and what was thought an improved mode, was followed by some farmers; they carted the dung, as it was made in early winter, to the field they intended for potatoes, and there mixed with light earth, peat, &c., in many cases adding lime. This heap they turned repeatedly over, three or four times, every turn inducing a new fermentation and an escape of the gases, and it was always becoming lighter and more easily managed. In the month of May, when planting the potatoes, it was somewhat like turf-mould, light and easily spread in the drills, and the dung heap had dwindled down to half its dimensions. But this system has also been abandoned; not that they were aware of having outraged any scientific principle in the procedure, but they found that the dung had been nearly effete, and all the succeeding crops were inferior. A much better mode is at present adopted by skilful farmers; if they cart out their dung at convenient times, they take care to mix it with light earth or dried peat, and in moderate quantity. They, of course, dispense with the lime; nor do they turn the heap so frequently, allowing its gases to evaporate. This they find to give better crops and improve the condition of their land. We hope they will still improve in their practice, and cease mixing their dung heaps in the fields, but spread it, plough it into the land as they take it out, and cover it up. We have never considered it the best mode of managing manure, to draw it out and mix it in the fields in heaps, and there let it remain for months, withering and wasting before it was used. Were such heaps occasionally saturated with powerful liquid manure, it would entirely alter the case, and very much improve the quality of the dung in the spring. On large farms, or where the housing is inconveniently situated, this latter mode of drawing it out at intervals, and forming heaps in the fields, may be unavoidable; but in all such cases, saturating them with liquid manure frequently during the season ought not to be neglected. The other mode which we have alluded to, of drawing it during the autumn and winter, as it has been properly made at the homestead, and immediately ploughing or

digging, and covering it in the fields intended for green crops, has been fairly tried, and practiced with complete success, and would undoubtedly become general, were its merits better known. The fresh strong dung possessing alkaline properties, as well as the power of decomposing by the fermentative process, acts upon the inert matter in the soil, and renders it soluble in somewhat the same manner as lime; the carbonaceous and earthy matters absorbing and retaining the gases, and preventing their escape by evaporation. The fine, loose, free, and friable state of the soil, in the spring, and the ease with which it can be cleaned and prepared for crops, shows the effects of heat, and the chemical changes produced by the dung during the winter.

The chief objection to this mode of management is, that in the present state of farming generally, little manure is made during the summer months, and not sufficient for such purpose; but this is the best possible argument for an increase of cattle and house-feeding. By this system the greatest quantity and best quality is made in summer, and when buried in the ground no loss can be sustained; besides, the work is done at a time when horses are comparatively idle, it renders the spring work light, and enables the farmer to get in his crops speedily and in good season. We have no hesitation in predicting that in a short time all land intended for potatoes will be ploughed, cleaned, and manured in the autumn, when the crop can either be put in at that time, during the winter, or in early spring. Turnips require some stimulating manure to hasten vegetation at the time of sowing, but still the ground could be prepared in autumn in the same manner, and a small quantity of guano, bones, &c. put in with the seed. It may be urged, and with a degree of justice, that on the large farms of England and Scotland, where materials are scarce, labourers few, with high wages, it is difficult to make a sufficiency of manure in all seasons; but in Ireland no such difficulties exist—we have no such excuses. Our farms are small, we have plenty of labourers, and at a cheap rate; a variety of soil, abundance of peat; and withal in every season a most luxuriant crop

of weeds, over the whole face of the country, in the fields, the ditches, and the roadsides: this latter is no inconsiderable advantage, were the people to avail themselves of what nature and their own bad management have thrown in their way. Were the docks, thistles, and other weeds which are found on almost every farm and roadside in such abundance, cut green before they ripen their seed, bedded under the cows, and added to the dung heap, they would make a most important addition to it, not only in the organic matter they contain, but the large quantity of inorganic—the saline substances, which by their long tap roots they extract from the subsoil, and retain in their leaves and stems, all of which are so necessary to the growth and development of every crop. On various parts of the continent, farmers sow certain kinds of tap-rooted plants for this very purpose, for bringing up the inorganic matter into their leaves and stems, which they plough down green or in flower, and which are found particularly fertilizing.

In regard to collecting manure and forming of dung-heaps, a great variety of practices prevail, and some of them very erroneous. The modes of forming the heap and their situation are of great importance. It should neither be on a hill where the liquid will run from it, nor in a hollow where much water will accumulate and remain; neither should it be on a declivity where the running waters and rain may wash it; it ought to be immediately adjoining the office houses, where the dung and litter of cows, horses, and pigs, with the ashes and refuse from the dwelling-house and other offices, can be conveyed with the least possible trouble and expense. Sewers also should be constructed to convey the urine and liquids from all the houses, including the scullery and water closets, along the side of the dung-heap, so that these liquids could be scattered over it *every day*; and accommodation for loose earth, peat, &c., afforded, to absorb the extra liquid, and be alternately added to the heap with the dung. The space ought to be capacious, sufficient to hold the manure of all parts of the establishment for at least six months; it is not in the fields the best dung-heaps are to be made, it is here in

immediate contact with the houses, where a variety of substances, liquid and solid, are continually accumulating and fermenting together. There ought to be but one dung heap at every establishment, a reservoir for every kind of substance. It is a gross error to have the cow-dung in one heap, the horse in another, the pig in a third, and the refuse of the dwelling-house in a fourth, with the loose rich earth in sundry heaps, or in ditches through various parts of the farm; all should be collected together, blended and mixed thoroughly in one decomposing mass. It is an axiom established by science and practice, that the greater the number and variety of materials in any dung heap, the more powerful and efficient will be the manure.

The pit should be sunk twelve or fourteen inches below the surface, and if the subsoil be absorbent, lined with brick, cemented, or well puddled with clay, to preserve and prevent the escape of any fluid. The proper time to commence the collection of manure is in June, or immediately after the last of the former season has been used. In fact there ought to be no cessation of this operation at any season. If the cattle are house-fed, and all weeds of the farm and other refuse rendered available, *the summer is the chief time for making manure*; but in order to do the thing efficiently, a daily attention will be required. On a small farm this can easily be done by any member of the family, on anything of a large farm; a man should be employed at this work alone, collecting the dung from the different houses, the weeds from the ditches and roadsides, earth and peat if convenient, and bringing all to the main heap to be mixed as required. Every day the fresh urine and slops in the reservoir should be scattered over the heap, and the liquid manure collected in a tank at the opposite side, carried out, and applied to the crops; or returned to the dung heap. A man so employed would make a better return for his wages, than any other labourer on the farm.

We have repeatedly, during our course of lectures, pointed out to the schoolmasters of Ireland, how comparatively comfortable and independent they would be, each holding a small piece of land in the neighbourhood

of their school, which they could manage and cultivate morning and evening, with the assistance of a labourer, or a class of boys occasionally. This would be recreation, health, and a benefit to themselves; the example would be of the greatest importance to the boys in the school, and in the neighbourhood. All the objections that have been urged against schoolmasters holding land and neglecting their schools, are quite unfounded, and have been proved so; there are no schools in the country better conducted, so far as literary instruction is concerned, than our agricultural schools; and as in every school agriculture ought to be taught, as a branch of education, the small farm would enable the teacher to do so practically and efficiently. Suppose the attendance of the scholars was on an average fifty during the year, and the teacher had three acres of land; and if there were privies and conveniences, constructed for preserving all the excrement, with the slops from the dwelling-house, mixed with ashes and sweepings, with, if necessary, some peat or light earth to render it portable. From this scourge alone he could manure one acre, or one-third of his farm, on a three-course shift; on one-fourth of four acres on a four-course rotation, and in quite a superior manner. This advantage the schoolmaster has over all other small farmers of cultivating his land in the best manner. It is a serious matter, all the excrement of the human race that is lost in this way, besides the filthy and disgusting appearances that present themselves on the road sides and ditches in the neighbourhood of our schools. Such an example in every school would be invaluable to the children, in teaching them early habits of economy, decency, and cleanliness. If to each school there were attached a small model farm, the whole country would be studded over with them, where every farmer and labourer's child would be taught the science and practice of raising the food of the human race; this is the true way of advancing agricultural improvement, of laying the basis and sure foundation for it. "Train up a child," &c. All the societies that have yet been established, cannot compete with them in carrying out this great principle.

The subject of the waste of manure in towns has much engaged the attention of scientific and practical men, but does not immediately fall in our way at present. It is much to be regretted, that in this great age of enterprize and improvement, by steam and otherwise, that nothing has been done on this very important subject—important for both health and economy.

In regard to liquid manure, the greatest attention and care is required. The process of fermentation and decomposition brings all manure, of whatever kind, into a gaseous and liquid state. The dung heap, therefore, will in course of time become soluble, with the exception of the earthy matters it may contain, sand, clay, lime, with perhaps a little magnesia. A portion of these earths themselves become soluble, by uniting with acids and alkalies, forming salts; and the process of these changes is much advanced by turning, exposing it to the air, and inducing new chemical action. All manure, therefore, before it can become the food of new plants, must be in a fluid or gaseous state; and the nearer that state it is, the sooner it will accomplish its ultimate purpose; but in this state we find it in liquid manure—all the different kinds of food, organic and inorganic, dissolved in water. The organic portion of all the animal and vegetable creation is composed of four elements, carbon, oxygen, hydrogen, and nitrogen. But organic matter, when decomposed, does not remain in an elementary state; the elements immediately enter into new combinations and forms of matter. A portion of oxygen with the carbon forms carbonic acid; the remaining oxygen with hydrogen forms water; and the remaining hydrogen with nitrogen forms ammonia. These three compounds, carbonic acid, ammonia, and water, are the organic food of plants. The inorganic food is more varied, both in regard to its proximate and ultimate principles, and is chiefly composed of the salifiable bases in combination with acids in the form of salts. Lime, soda, potash, and magnesia, are the principal. These are also soluble in water, and present in the liquid; and if the urine has been regularly scattered over the dung heap, it decomposes another class of



enriching substances—the phosphates, and salts of ammonia, which join the liquid. Thus we have seen, that three substances, carbonic acid, ammonia, and water, with the several inorganic soluble salts in solution, are the true food, nourishment, and sustenance of plants, and eventually of animals. These facts ought to startle the farmer, and make him reflect that the dark liquid, which oozes from his dung heap, is evaporated, or finds its way to the nearest gripe or river, is the true food of plants already prepared for their use; and this will explain to him the reason why it has, when judiciously applied to his crops, such an immediate and powerful effect upon their growth. This is the essence and spirit of the dung heap. When this is gone, the residue is comparatively inert and useless. He should therefore collect it carefully and constantly, carry it out to the fields or the garden, or return it over the dung heap. It should always be borne in mind, that a dung heap which has the liquid in it, and one that has lost it, are very different in value, and will act very differently on the crops. A quantity of light earth or peat ought always to be convenient to the heap, to cover it occasionally, and to spread around to absorb the liquid that might otherwise run off. Wherever there is a quantity of decayed straw, vegetables, or even animal dung, there will be the seed of annual or other plants. If this be used fresh, undecomposed, the seed will vegetate, will foul the land and the crops, and perpetuate the farmer's annoyance. But no such thing can happen when the heap is sufficiently decomposed, the heat generated by the process, and continued; and the new fermentation, induced repeatedly by the continued application of fresh urine and liquid, will dissipate the germ of every such seed; and practically, we find the well-rotted dung produce the clean crop.

With regard to tanks for catching and saving the liquid, they are certainly necessary in a degree, but not to the extent sometimes recommended. At the Model Farm we have four barrels, formerly used for oil, and with covers. They are quite sufficient for the purpose, and the cost did not exceed £4. Any farmer can pro-

vide himself with such at a moderate rate; and on a small holding, a couple of herring barrels, sunk at opposite sides of the dungheap, will suit all the purposes, and a couple of old tin cans will serve to draw it up for use. Where peat and light earth can be easily obtained, it is better to use it by absorption on the heap than in any other way. The alkaline properties of fresh urine will undoubtedly be injurious to vegetation if applied in that state. It ought always be allowed to ferment, or be thrown over the dung heap where fermentation is going on, and where it will immediately join the process, be decomposed, and run in with the other liquid manure in the most powerful state. This may be used with safety to almost any crop. The using it in the fresh and caustic state has been the means of raising a prejudice against it.

Of late, two very important substances have been discovered and used as substitutes for farm yard manure. We mean bone dust and guano. They are entitled to rank far above any of the recently prepared artificial manures, on account of their well ascertained steady effect in producing, particularly, green crops. Guano suits almost every soil and crop, and is calculated to advance improved cultivation, in raising turnips and other green crops in our poor worn-out soils already in cultivation, and inducing the improvement of our waste and hitherto unproductive land. In these respects, the discovery and use of this substance is an important era in the history of farming. No farmer is excusable now, who has not a sufficiency of green food for his cattle. A comparative trifle in the purchase of guano will produce a crop of turnips, and will start him in a new and profitable course of management. To the cultivator who commences the first year in a poor farm without manure, or who wishes to extend his cultivation, and provide for the keep of additional stock, bones and guano are invaluable. They set him upon his legs, and place him in a proper and advantageous position. But being so placed, and provided with a sufficiency of food for an adequate number of cattle, if he house-feed and mind his dung pit, he will not again require guano or

any extraneous manure, but will have quite sufficient for all his purposes, and of a quality superior to anything that ever was, or is likely to be discovered.

We have a great deal more to say on the subject of manures, their nature and properties, but to the proper understanding of which, it is necessary that we should understand something of chemical science. We will, therefore, reserve the further consideration of this, with the important subjects of lime, and soils, for a future part of our course.

---

## CHAPTER XVI

### TENTH ERROR.—SUFFERING THE LAND TO BE OVERRUN WITH WEEDS.

THE present is an egregious error, which, without argument or proof, will be admitted by every individual in the country, possessed of the sense of sight. It is confined to no locality; it prevails east, west, north, and south, wherever the land is cultivated, and no matter what may be the description or quality of the crops, the weeds are found also in abundance, disputing the sovereignty, and often with complete success. It appears that the people have become so accustomed to weeds and dirt, that the idea of clean land has never entered their mind; indeed they seldom see an example of such, and have learned to recognise the right of the weeds to a share of the soil and manure. It is curious to observe the great care taken to preserve the most noxious weeds, until they ripen their seed and perpetuate their race. In the fields of grain, barley, wheat, or oats, the docks and thistles are not only allowed to grow, and thrive during the summer, but in harvest, the grain is carefully cut, and they allowed to stand, ripen their seed, and scatter it abroad, the succeeding culture will cover and nourish it. An excuse is often made, that by going among grain crops to pull

weeds much injury is done. This, however, cannot be an excuse in potatoes, and other green crops; yet the weeds will be found growing there also, luxuriant and unmolested, until the autumn, when they have all ripened and shed their seed. The land is afterwards tilled and turned over, and the seed has got a favourable bed, and the best means of reproduction. The moist climate, and the natural fertility of the soil in Ireland, are great causes in producing weeds; the farmers, therefore, ought to be more particular in taking precautions to keep the land clean; but we find it otherwise,—their bad culture, injudicious cropping, indolence, and carelessness, increase the evil in a tenfold degree. We have frequently taken occasion to differ from the farmers of England and Scotland in their modes of culture; but in this respect, in cleaning their land, and eradicating weeds, they are immensely superior to us. We will not say that they are a century, or half a century before us, for we could be at least alongside of them in two or three years, did we use common skill and exertion. How often do we see the numerous offspring of the small farmer idling their time upon the streets, engaged in mischief, tearing the rags from each others shoulders, while the potato fields are neglected, and overrun with weeds. Here is free labour unemployed and lost, while the English and Scotch farmers will employ men, women, and children, at high wages, to do such work, rather than allow their land and crops to be overrun with weeds. The great expense incurred by these people in keeping their ground and crops clean, does not arise merely from taste or a desire to exhibit correct and neat farming; they have more substantial reasons, which a little consideration will enable us to divine. In the first place we ought to recollect, that weeds occupy a certain space of ground, often more than the crops. We need not then speak of thick or thin sowing where weeds are abundant, when all the space between the stalks of the plants are occupied by weeds. But every kind of cultivated plants thrive when they have air and light, and not otherwise, and where they are covered and choked

with weeds, these most essential and natural agents are excluded, and the crops suffer privations. This is easily proved by the plants on the brow of a ridge, or in a wide space, thriving best, while those growing close together, or covered by weeds, will be delicate and worthless. Besides the space the weeds occupy, they also monopolize at least their full share of the manure and food from the air and the soil, robbing and starving the crops, exhausting the land, and for which they make no adequate return. They likewise do much injury under ground, the creeping roots of certain kinds, such as couch grass, traverse and bind the soil together, rendering it impervious and difficult of labour. For all these, and many other reasons, the land should be kept clean. But no efforts will be sufficient to keep the inside clear of weeds, so long as the roadsides and fences are seedling beds and receptacles for roots and seeds. Nature has provided the most noxious plant with ample means of distributing its offspring, and perpetuating its kind. Even the birds of the air and the winds of heaven assist marvellously in this work. Therefore, all the adjacent roadsides ought to be kept clean, the weeds cut green and carried to the dung heap; and all the ditches and fences inside the farm particularly so. These cleanings, if carefully appropriated, bedded under the cattle, and added to the dung heap, will do more than pay the trouble of collecting, and will serve much to increase and enrich it.

The most troublesome and noxious weeds in this country are couch grass, colts' foot, docks, thistles, dandelion, &c., with wild marigold, prasnagh, wild kail, charlock, and groundsel; but all this formidable host, with many others, annual and perennial, may be perfectly eradicated and got clear of, by a very simple process—a judicious rotation with the culture of green crops. This system will completely banish, and prevent their appearance again.

In the process of properly preparing the land for green fallow crops, and in the after culture during the summer months, it is impossible for any weeds, annual or perennial, root or seed, to escape destruction, if the

different operations are performed as they ought to be. Ploughing or digging over the land, and picking the root weeds in autumn, turning it again in spring, pulverising and picking, and destroying the young weeds that may arise from seed, before the seed of the crop is sowed; and during the summer, horse and hand hoeing, digging and picking up the roots frequently, the land must be thoroughly cleaned. If roots or seeds remain after the crops are put in, they cannot escape the after culture. The alternate grain and green crops afterwards, are a sufficient bar to their reproduction or appearance.

---

## CHAPTER XVII.

### ELEVENTH ERROR.—OUR IGNORANCE, INDOLENCE, AND OTHER BAD HABITS.

FROM our preceding remarks it will be obvious, that there is nothing mysterious or difficult in successful farming, in cultivating the soil so as to keep it in the highest possible condition, at the cheapest rate, and to receive from it the greatest amount of produce. This ought to be the aim and object of every cultivator. Neat farming is highly desirable, but profitable farming is still more so. The best farmer is he who raises the most produce, and makes the most money from the same quantity and quality of land; and in accomplishing this, there is nothing more required than a common understanding, with a willing and persevering disposition, for there is nothing very difficult to be accomplished. There are only a few cardinal points in superior and profitable cultivation, which if correctly observed and carried out, will accomplish all that is desirable.

First.—Cultivate *all* the land, leave none useless or idle.

Secondly.—Drain and dry the land sufficiently.

Thirdly.—Trench and deepen the land.

Fourthly.—Follow a judicious and profitable course of cropping.

Fifthly.—Raise abundance of green crops.

Sixthly.—Increase the stock of cattle, house-feed them, make manure and money.

All these any farmer may accomplish if he will only begin in good earnest, and determined not to allow slight difficulties to stand in his way. The Belgian, on his small or large farm, does all this, and he is not so well circumstanced as we are. He pays much higher rents and taxes than we do, and from an inferior soil. Yet he enjoys comfort and independence. True, he is better informed on agricultural subjects, and follows a better system of farm management; but it is chiefly by his indomitable perseverance, his untiring energy, his never ceasing industry, his rigid economy, and his strict practical equity and honesty, that he is enabled to attain such high eminence. He will not neglect, or refuse to improve his land, lest his landlord should receive a few pounds more rent; he knows that by the increased produce he is the chief gainer himself. Nor is he afraid of being turned out of his holding, for he labours and manages it so, that a better tenant could not be found. He wastes no time, he and his family are employed on the farm late and early. His habits of industry are complete.

Let us look minutely into ourselves, our own conduct, and compare it with what we have been describing. Do we pay the same unremitting attention to our business, to our farms, according to our measure of knowledge? Are we constant, late and early, at our work? And do we encourage and enforce the same duties upon our families, and the rising generation? Are we energetic, economical, and punctual, like these people? We presume we must answer in the negative, and confess that we neglect our duty in all these respects; and are as far behind the Belgians in this, as we are in point of comfort, respectability, independence, and the estimation of the world.

The next question arises, Are there substantial reasons why we should be in our present condition? Are there

circumstances, over which we have no control, that keep us so? Or have we it in our power, by an effort or by a different course of conduct, a superior mode of management, to better our condition, improve ourselves, and the country? If we be candid we must admit that more of our success in life, of our prosperity and happiness, depends upon ourselves, the efforts we make, and the judgment we exercise, than upon all other causes combined. If we are determined to exert ourselves, there are few adverse circumstances to counteract our efforts. The laws are mild, and favourable to the agricultural interest; they are taxed with being particularly so. The government is endeavouring to disseminate agricultural knowledge and promote improvement. Public societies have been organized in various parts of the country, and private individuals in their several localities are exerting themselves to the utmost. Many of our landed proprietors are acting in concert. Everything is favourable for the improvement of the country, if we will only join heart and hand, determined to improve our own condition. If we do not, all the efforts of all the other parties mentioned will prove abortive, and our fine country will remain, as at present, the scorn and derision of the world.

We are endowed by nature with mental and physical powers of the first order—capabilities of achieving as much as any portion of the human race; but we appear to require extern motive power to drive us into action. If left to ourselves, in general we will accomplish nothing. We are continually bestrode by an incubus—a kind of nightmare, that keeps us in a half paralytic condition. It is a combination of the three greatest enemies of the human race—*ignorance, indolence, and prejudice*. These counteract the best designs of Providence, and produce the state of things we must all deplore. These facts may be unpalatable to some, but we think it right to state them. We do not wish to flatter prejudices at the expense of truth; we have been too much used to that, and it has done great injury. We have been led to blame everything but ourselves for our misfortunes. This has rendered us apathetic,



and worse, and prevented us from taking the proper course to improve our condition. Philanthropists and others, with mistaken zeal, call upon Government and Parliament to do something for Ireland—to advance money, encourage public works, &c. This may be no harm in the first instance; but we fear the call will be often repeated, and we would not vouch for the final success of the experiment. *We would call upon the people (we mean all classes) to do something for themselves.* With all our alleged inability, we maintain that we have more power than both the Government and Parliament to permanently improve our condition, and render ourselves what we ought to be, comfortable, respectable, and independent.

It is alleged that the great bulk of the tenant farmers are unable to better their condition; that they are oppressed with rack-rents, get no encouragement, and have no permanent security in their holdings. We have before given our candid opinion of the mode in which a great portion of the landed property in Ireland is managed, and the necessity for an entire change in the relation between the proprietor and occupier. There are and have been too many cases of injustice and oppression—more, we would hope, through ignorance than a desire to render the people unhappy. But even such misconduct towards us is no good reason why we should fold our arms, remain in poverty and distress, without an effort to improve our circumstances. This apathetic state of despondency is the worst in which human nature can be placed, and can never lead to beneficial results for either landlord or tenant. It is undoubtedly the duty of the tenant to be industrious, to use his best exertions, and to cultivate his land in the best manner, so that he may be able to fulfil his bargain, pay his stipulated rent, and maintain himself and family in somewhat a comfortable and independent manner. If he cannot do this, he ought to cancel his bargain, and endeavour to better his condition in some other line.

There cannot be a more delusive idea formed or entertained by any man, than that he will succeed in

getting a reduction of rent by careless and bad cultivation. The value of land is now no mystery to either landlord or agent. There are instances of superior and profitable cultivation, in almost every district of the country, which have plainly proved what land is capable of when properly farmed. Landlords have their eyes open as well as tenants, and are aware of all this. It is, therefore, the height of folly for the old school of farmers to rail against any improvement in agriculture, because it may "*open the eyes of the landlords.*" Better modes of management will force their way in spite of prejudice and ignorance. They will be adopted by the rational and intelligent in the first instance, and eventually by all. When land can be improved, and made to pay by good management, proprietors will not reduce rents to the indolent and backward tenant, and they ought not; it would be a premium upon misconduct; it would be a bad example, and attended with evil consequences.

The general rental of Ireland is not too high; it is not so high as in Scotland, England, or Belgium. Even in our own country, where the rents are lowest, according to the quality of the land, the people are poor and least able to pay them; and in our most prosperous and thriving districts, the land is of the poorest quality, and the rents comparatively high. A reduction, therefore, to these poor people would be of no avail; it would only tend to perpetuate the evil. Our advice, therefore, is, they should be up and stirring, shake off the scales of prejudice, change the old unprofitable system for a better; and they will soon be able to pay their rents, and live well. All disputes between them and their landlords will cease. This course will secure a permanency of tenure. No landlord will distress or part with an honest, industrious, and improving tenant; he will rather secure him in his holding, to render him happy and contented. If a farmer really wishes for a lease, let him show his landlord that he deserved such, by the punctual payment of his rent, and the improvement of his land. But should the landlord after this neglect his duty, the tenant has the consciousness that he has acted

properly, and kept himself upon the right side, and his condition cannot be worse than if he had acted in a different manner. It has been often said, and truly, that the rents are high enough or too high for the Irish farmer in his present state of knowledge. We are prepared to admit all this; but that is the best reason why he should increase his knowledge, extend his system, and consequently better his circumstances.

One of the greatest errors prevailing among our farming and labouring population, and which leads to serious losses, is their disregard of the value of time. They do not consider that the loss of time is the loss of money. A labourer who works for a shilling a day, will, to oblige a neighbour, or gratify some foolish propensity or whim, willingly spend a day and lose his shilling; and the farmer, who should earn at least three times as much as the labourer, being present, superintending or working upon his own ground, is even more culpable in this respect. So ignorant are our farmers of their business, their trade, and of the attention that the smallest farm establishment requires, that we generally find them directing their attention to some other concerns. They are horse-jobbers, road-jobbers, cow-jobbers, pig-jobbers, corn-factors, potato-factors, contractors for everything that will divert them off their farms, and give them an excuse for attending fairs, markets, and public places—their concerns at home being left to strangers, in general as attentive, honest, and conscientious as themselves. They would rather gain 5s. by the sale or purchase of an old cow or horse, or 1s. in the transfer of a sucking pig, than earn £5 by a superior crop of wheat, oats, or potatoes.

There is no probable estimate that would come up to the sum that farmers lose in this way, by dividing their attention, and neglecting their proper business.

But to return to the common day labourer or tradesman, and to be under the mark, we will estimate his wages at 1s. per day, and we will say that one-eighth of the population, or one million, are of this class, and that each loses or misspends a working day in the year—this amounts to the sum of £50,000; and we will not over-

rate the time when we say that each individual loses ten days in the year, which at the same rate would amount to half-a-million of money lost to themselves and to the public. We have only taken a fraction of the people, and a low sum for each; could we form a correct estimate of all the loss sustained in this manner, it would be a startling affair indeed.

Example is contagious, particularly for evil, and unfortunately the imprudence of the parents descends to the children; they are early nurtured in their improvident and lazy habits, which they carry through life again. Nothing is more required to produce a salutary change in this country than that the children of the farming and labouring classes should be brought up to industry and labour from their infancy. A serious infatuation, and a mistaken fondness for their offspring, pervades these classes; the children are indulged in early habits of inattention and idleness, which stick to them through life, producing the most serious consequences to themselves, and retarding the prosperity of the country. There is nothing more common than the complaints of farmers against their labourers, for inattention, indolence, and dishonesty in their work; thousands of acres of our best land are uncultivated and unprofitable, and many thousands of our population are idle, from this very cause; all arising from the vicious habits the people have contracted in their childhood.

---

## CHAPTER XVIII.

### FARMS IN GENERAL—CHOOSING, LAYING OFF, AND GENERAL CULTIVATION.

DURING our preceding remarks we have frequently alluded to the size of farms, and have endeavoured to show, that it is not so much the quantity of land as the mode of management that will enrich the farmer and be of general benefit to the public. The skill and energy

of the cultivator determines the value of any farm, large or small, and there are advantages and disadvantages attending both. It is the natural disposition of man to progress and accumulate, he is always grasping, and in the matter of land a farmer can never be satisfied with the quantity he possesses: this is a manifest evil, not alone to the farmer himself, but to the public, to the labouring population, and the consumers of produce generally. A man would be much better and happier with too little than too much land, the latter is burdensome and leads to embarrassments, and we are afraid if the matter were fairly canvassed, and strictly looked into, it would be found that the great majority of the farmers of the United Kingdom are in the latter state; having much more land than they have skill and means to manage. This is the chief cause why the gross produce of the land is so much less than it ought to be, and would be, if every farmer had his sufficient quantity and no more. Such a desirable arrangement, however, would be very difficult to carry out, almost a matter of impossibility; as every man will take more if he can get it, but none will part a portion of their land, not even to the extent of a cottage garden to a labourer. A great jealousy and prejudice exists in the minds of the extensive landholders against the small farms, and there is some reason in this; were the occupiers of small farms to mind themselves, and adopt a proper system, (the garden management,) they would soon put to shame their more opulent neighbours. The common labourers on their small allotments in England, have managed to raise such an amount of produce, as has caused the farmers in their neighbourhood to stand and stare in astonishment.

If every farmer could be satisfied with a moderate quantity of land, as much as he could cultivate to the best advantage, there would be less competition, there would be enough for all parties; the yearly produce of the country would be immensely increased, and there would be an abundance of employment and food for all the people.

## PROPER SIZE OF FARMS.

This question will be determined in general according to taste, judgment, or prejudice; but notwithstanding the difference of opinion that may arise from these causes, still there are certain conventional rules, established principles which ought always to be kept in view, in the taking or letting of land.

All farms may be divided into two classes, large and small, horse farms and spade farms. Large farms to be well managed must have, besides the horse, a competent number of labourers, and this number will be regulated by the mode and minutiae of labour that is carried out, and the quantity of land that is in cultivation.

Small farms will require a degree of horse work, to the extent of carting fuel, manure to the fields, materials for draining, drawing in crops, and produce to market, but for no other work; a small sum annually for horse hire will accomplish all this. It has been well ascertained, that a man with an average family, industrious and willing, working constantly, and following a judicious rotation, will easily labour a farm of from eight to twelve statute acres; we will take the average at ten acres, *and this ought to be the extent of the small farm.* It is quite possible for an intelligent person to cultivate a great deal more land and profitably by the spade. We do not despair of seeing fifteen or twenty acres done so; in the neighbourhood of cities and towns, market gardeners and narseymen can accomplish all this, and what is done in one situation is quite possible in another; but in estimating ten acres as the extent of the small farm, we mean that an ordinary man, with an average family, can be profitably employed upon this extent, pay a fair rent, and live independently and comfortably, as every farmer ought to do.

A one horse farm (managed as our one horse farms usually are) is altogether inadmissible—there ought to be no such thing at all; by such means no farm can be profitably managed. It might be quite possible to cultivate a farm of twenty-five acres by the spade, keeping

a horse to do the necessary drawing; food for cattle, manure, crops, &c., but this management would be beyond the skill of the ordinary farmer. The usual modes of conducting such farms with us is both unthrifty and unprofitable; but two horses on a small farm are still worse, they consume a great portion of the produce.

We may say that the minimum extent of the large or horse farm ought to be from forty to fifty statute acres. Two horses are sufficient for this, or five horses for one hundred acres. Fifty, therefore, or a multiple of fifty acres, is the proper size of large farms, and ten acres the best for the small farms.

#### CHOOSING A FARM.

It is seldom in Ireland that a man can get his choice of a farm, or that he can suit himself to his mind in every respect; it is rare indeed that in any situation a farm can be found combining every desirable quality and convenience. In most cases an Irish farmer is glad to get hold of a spot in any situation, of any quality, and at any price—a habitation, an asylum for a time are his chief objects; but as it is desirable that this state of things should be altered on every account, and that the landlord and tenant should treat upon equitable, honest, and reasonable terms, and that the parties should afterwards carry out the contract to the better, and in a strictly honourable manner, for this purpose it is particularly requisite, that the tenant should exercise his best judgment on the choice and selection of his farm, his future home, where he may expect to spend his days, and make a decent livelihood for himself and family. A few hints on such an important subject may be serviceable in such case.

The aspect and outward appearance of land will, in general, to a practised eye, give strong indications of its nature, properties, and condition, whether it be rich or poor, wet or dry, in a neglected or highly cultivated state; yet in many instances some of these appearances may be deceptive. A farm of very superior land may be poor, wet, neglected, and dirty, the fences out of

order, and the housing bad. Such farm, in such a state, will show to great disadvantage, and be accounted bad land; but let it be drained, cleaned, and manured, the housing and fences put in order, and it will exhibit a very different aspect, and show by the produce the true quality of the land. Again, land of a very inferior class, if it has been neatly farmed, well laid out, dry and clean, the fences neat, and the houses in good order, will take the eye to great advantage, though when it comes to the test of cropping it will discover its inferior qualities, so that land, like merchandize, will be accounted valuable, according to the state in which it is exhibited or shown off. But we must not judge by appearances; we must examine practically what is the nature and condition of the soil, and what are its capabilities. We have repeatedly said that there is no really bad land in Ireland, no land that cannot be improved, except where the rock appears at the surface, or immediately under it; but there is a *vast deal of good land very badly managed*. The more we think on the matter, the more we are convinced that we are right, and we believe the facts will bear us out. A few years ago in every parish, townland, or even farm, a certain portion or number of fields were accounted good land, and was of course petted and treated well; and another was accounted bad, was neglected, and mismanaged; but in many cases the bad land has been thorough-drained, subsoiled, permanently improved, and it has actually become the best of the land. This has happened in numerous instances in our cultivated districts, in a short time, and by the same means we may cure all the bad land there. Again, in our waste land, bog, mountain, and marshes, which were thought to be in a hopeless, unreclaimable, and quite unprofitable state, except for the pasturage of a few wretched cattle and sheep; the oat and other grain crops that were tried, having failed from the humidity of the soil and climate. But in a very few years what has human skill and judicious management achieved? In the most inhospitable and forbidding situation in the kingdom, on the estate of Kippure, in the Wicklow mountains, from 600 to 1,400 feet above the level of the



sea, and where the peat is from five to twenty feet deep, the most magnificent crops of potatoes, turnips, mangel wurzel, carrots, Italian rye-grass, and other green and grain crops have been raised. Formerly, when these mountains were merely pastured by a few poor hardy sheep and cattle, it could only be during the summer; in the winter, they were sent down to the plains of Kildare to be pastured and paid for. Now the largest bullocks and best cattle and sheep can be maintained and fattened summer and winter on the abundance of green crops that are raised. The soil and climate appears peculiarly favourable to the growth of these crops. The same thing has occurred on the waste land near Marble Hill, in the county of Galway, and in Kerry, and the same means will produce like effects on any other mountain district in the kingdom. The low bogs and marshes, when drained and improved as they ought to be, will form the most productive and fertile valleys in the country. In a very few years, if agricultural enterprise and improvement progress as they are likely to do, our assertion will be verified that there is "no really bad land in the country."

As the surface or superficial view of land cannot be depended on, therefore in choosing a farm it will be necessary to ascertain its real value by close inspection, not only the depth and constituents of the surface, but also the nature of the subsoil, whether it be retentive or porous, similar to the surface in quality or otherwise, and its capability of improving the other if brought up. If both the surface and subsoil be heavy, containing much clay, the land will be expensive to drain and labour, but will be substantial and productive, particularly in grain crops. If the surface be of a heavy description, and the subsoil even at a considerable depth, porous and light, by trenching and mixing they will improve each other, and a fine free dry soil may be formed. If the surface be light, peaty, or sandy, and the subsoil heavy and tenacious, such land will be wet and unprofitable, unless it be well drained and deepened. The latter operation will very much improve it, and a good fertile soil may be the consequence. If both the

upper and subsoil be light, this will be dry but inferior land, under all circumstances, unless improved by drawing heavy soil over it and mixing. This, however, is an expensive process, but very effectual. The best land is that where the surface and subsoil are capable of improving each other. This constitutes our deep, free, sandy, and clay loams. Our limestone soils are good, for they contain sand, clay, and carbonate of lime, in fair proportions, with some magnesia.

Chemical science comes to the farmer's aid in ascertaining the qualities and value of his soil. He should, therefore, get a portion from the different fields analyzed, to know in what proportions the earths are present, the quantity of organic matter, and if there be any deleterious substances, such as metallic salts present. To constitute fertility in a soil, the earths must be in certain proportions, not too much of one nor too little of another. A good fertile soil will be in somewhat the following proportions:—

Of silica from fifty to sixty per cent.

Of clay from twenty to thirty per cent.

Of carbonate of lime ten to fifteen per cent.

with some magnesia, oxide of iron, saline substances, and organic matter in variable quantity, from six to fifteen per cent. This latter can be supplied at all necessary times, and in the required quantities.

Having ascertained the nature and qualities of the soil, the next point for consideration will be the state of the cultivation and previous management. If the housing be commodious and in good order, the fields well laid out and fenced, the land well drained, dry, and clean, and in high condition, a comparatively high figure of rent will not be found oppressive. There requires no outlay of money except for the necessary stock and crop, nor delay in raising money from the land; the machinery is complete, in order, and only requires the necessary skill to set it in motion and keep it going.

On the contrary, though the soil may be naturally good, if the housing be scarce, inconvenient, or out of order, the fields injudiciously laid out, and the fences bad, the land wet, dirty, and poor, the farmer ought to

seriously consider whether he has the means of remedying these evils before he undertakes such a task. He must consider that it will require much outlay in the first instance; and it must be a considerable time before he can have any adequate return from the land. He ought to consider the tenure by which he is to hold it, and the sums necessary to accomplish all the necessary permanent improvements, the stock that will be sunk with the interest, and add all to what would be considered a fair rent. If he do not take these precautions, but engage in such a task without sufficient capital, he will pursue a most erroneous and vicious course. The state of cultivation and condition of the land, is, therefore, of the deepest importance, and requires grave consideration, and the foregoing considerations and conditions ought to regulate and influence all prudent and honest men in the taking or letting of land.

There is another consideration which has hitherto influenced the value of land to a great degree—its locality in regard to good markets for produce and other necessaries. Land in the immediate vicinity of cities and large towns, has always been highly valuable, in fact artificially so; and the rent has been in general regulated more by the vicinity of the farm to such markets than by any other cause. The short time and cheap rate at which produce of every kind may be conveyed and disposed of, the saving of labour and expenses, and the facility of getting abundance of the best manure returned to the farm, would necessarily materially influence the value of land, and increase the competition for it. Certain farm produce of great value may be raised and disposed of readily in such situations, which cannot be so valuable in remote localities, such as milk and other dairy produce, with green vegetables of various kinds. But though these circumstances have heretofore regulated the price and value of land convenient to towns, and may in certain situations do so still, human ingenuity and enterprize will undoubtedly change those circumstances materially, and the value of land will be more equalized through every part of the country. Railroads will tend to level all distinctions, and

bring the most remote and hitherto neglected districts upon a par with the formerly favoured spots. Produce of every kind can then be conveyed at a moderate rate, and in the shortest time, to the most distant market, and by the same means manure and other necessaries can be returned. We can easily conceive a railway train from Galway or Tipperary arriving on a morning in Dublin—in one waggon cream, new milk, butter, even buttermilk, with eggs, cheese, &c. &c., and in another, cabbages, turnips, carrots, and a variety of other vegetables. When this comes, and come it will in a short time, good bye to the monopoly of dairymen and market gardeners in the Dublin markets; and good bye to £10 per acre for grass and market gardens in the vicinity. Another circumstance will influence this change materially; it is the improved system of green crops and house-feeding. When this becomes general, the farmer will be independent of the towns for manure. No matter where situated, he can make abundance for all his purposes, and without any outlay of money. Under all these circumstances, it might be well for the farmer to pause and consider well before he enter into engagements in any part of the country.

Another subject and matter for the consideration of the tenant is, the vicinity of the farm to good roads. Nothing tends more to retard the improvement of a country or district, or even a farm, as bad roads; there must be means of communication to and from the farm, therefore the vicinity of good roads is most desirable. It is only in rare instances and remote parts that we have to complain of bad roads; of late years, roads have been extensively made through every part of the country; and railroads will be of immense value to the country in this as well as other respects.

Plenty of water at all seasons, and in various parts of the farm is of much importance. Among the many advantages that we enjoy in this country is, that on almost every farm there is water, more or less; it is not so in other countries, and is found a serious difficulty. The house and offices ought to be well supplied, and conveniently, and every field should have a supply for

cattle; in house-feeding this is not of so much importance.

Another consideration will be, is the farm convenient to fuel, turf, or coals, as the purchase and conveyance of these may be a considerable item in the yearly expenditure; and are there quarries or stones in the neighbourhood for building and drains? Some land is very inconveniently situated in this respect, which is a considerable drawback; so far, however, as drains are concerned, tiles and other materials will alter the case; thus we see that the progress of knowledge and science bids fair to obviate what were thought inseparable difficulties, to remove our former privations, and place us in an entirely new and much more advantageous position.

Limestone or kilns, where limestone is burned and sold, is a matter of considerable importance to every farmer, he must have an occasional supply of this, no matter how abundant putrescent manure may be. It fortunately happens in this country, that this material may be found in abundance in almost every locality if searched for, and in the particular situations where it is most available and required; in the neighbourhood of our peat soils, bog and mountain, where a farm is inconvenient to lime, the necessary supply will be found very expensive.

There is a subject of much importance in some countries, but in Ireland it is only in a few localities that it can be so,—*the climate in which the land is situated*; its height in the atmosphere above the level of the sea. This will materially affect its temperature, and the growth and maturing of certain crops, particularly grain, such as wheat and barley; high lying mountainous land will be late, and the grain crops subject to blight, chill, damp, and fogs prevail in such situations for reasons before explained, not to speak of the exposure to high winds at seasons, injuring the crops and causing serious loss. Complete drainage, however, will go far to remedy these evils, and as we have before pointed out certain green crops thrive in such situations, and may be raised in abundance; this has been proved not only in our own country, but on the continent of Europe, in much more

unfavourable situations and climate. Not more than thirty years ago the people of Norway subsisted chiefly upon food imported from other countries, their own producing but little for the purpose; and that little of inferior quality. Such was their helplessness and dependence, that after the peace of Vienna in 1814, when the country was taken from Denmark and united to Sweden, and when the Norwegians resisted this arrangement and rebelled, a couple of small frigates in a few months, and without firing a shot, were sufficient to starve them into subjection, merely by cutting off their supplies, blockading the ports, and preventing vessels laden with provisions from landing them. And to show how far human nature is liable to error in predicting the course of events, this same union has been the means of conferring the greatest blessings on the country. An enlightened monarch with a paternal government, by the encouragement of trade and agriculture, has entirely changed the state of the country and the condition of the people. The inhabitants are now enabled to raise abundance of food for themselves, and some to spare; and of a superior quality to what they were before accustomed. All the principal green crops, such as potatoes, turnips, mangel wurzel, &c., grow luxuriantly, and in abundance; so plentiful are the potatoes, that the people cannot consume them in the ordinary way, and have found out a mode of turning them into whisky; to such an extent has this been carried, that the friends of morality and good order in the country have become rather uneasy as regards the temperate habits of these exceedingly innocent and well disposed people.

In whatever climate a farm may be, the state of its surface is of much importance; whether it is level or undulating in hill and valley, and the degree of steepness the hills may possess. Though the low land or valleys are in general the best land, still it is by no means desirable that it should be quite flat, or nearly so; there should always be a sufficient fall to carry off superfluous water. The flat low lying land on the borders of rivers and lakes, or at estuaries of the sea, are nearly worthless for this reason, though in other situations they would

form the best alluvial soils, as drainage, either natural or artificial, is indispensable to all fertile land. Again, hilly steep land is expensive and difficult to labour; when in cultivation, heavy rains wash down the best of the soil and manure, the fine and soluble particles from the top to the bottom of the fields; the plough and other implements bring down the earth before them, and the tops of the hills soon become thin and sterile. High lying fields are much exposed to winds during all seasons, which materially injure the crops. The best farm is neither steep or level, but gently sloping with a sufficient fall, and inclining towards the *south*, with a shelter on the north side. The east has always been a favourite aspect with the gardener, and ought to be so with the farmer. The first dawn of light, rising sun, and early rays, appear to have the greatest effect upon vegetation. The aspect, north or south, is of more importance than is generally supposed. The rays come direct from the sun and fall perpendicularly, or nearly so, upon the south side of the hill, but obliquely on the north side; all other circumstances alike, the south side will be warm and dry, when the north side is cold and wet; we find, therefore, the south the early side, the crops thriving and maturing themselves sooner. The cold winds from north-west to north-east during the year, particularly in the late winter, and early spring, do much injury, on these aspects, to the young and tender crops. We are by no means in favour of planting forest trees in hedge rows, but for the purpose of shelter, not alone for the animals, but for the land and crops, belts or skirting plantations judiciously laid out, on these unfavourable northern aspects, might be the best crops we could cultivate.

## CHAPTER XIX.

## LAYING OFF AND SUBDIVIDING A FARM.

THIS is a point of the greatest importance to the farmer, and will require the utmost of his skill and judgment; an error committed at this time will not be easily remedied at a future period, and a blunder or mistake may cause serious loss and inconvenience. The subject, therefore, will require time and mature consideration, before a final and correct conclusion can be arrived at.

We have before explained the nature of the several most common rotations, and the science of such courses, so that they may be changed and varied according to circumstances, to suit every change and variety of plant, soil, situation; every variety of crop and mode of cultivation may be adopted on the several rotations, and changed at any time without in the slightest degree disarranging or breaking through the course. It is to be recollected that the three, four, and five courses are the bases of innumerable rotations, and may be changed and varied *ad libitum*; and it may be convenient on an extensive farm of various soils to have it laid off in different rotations. Almost every year, nay month, the intelligent agriculturist is adding to his previous knowledge, new discoveries are being made, and his own practice and experience are suggesting most important ideas and improvements; this latter is the fertile and true source of all substantial information. New crops and new modes of culture must be adopted, and in our system of rotations we must be prepared to avail ourselves of every improvement; the best of us are still in our infancy, and may expect great changes in our hitherto imperfect systems of cultivation.

The housing and their situation will demand our first attention. Every industrious farmer ought to have a neat, commodious, and comfortable dwelling for himself and family, besides ample accommodation for his cattle and animals of all descriptions, houses for storage of his



crops of every kind, fuel, &c. Such conveniences give him great facilities for getting quickly and regularly through the various work and farm operations during the year, besides securing and economising his produce.

In Ireland it is only in rare instances that we find such accommodation upon a farm, and on estates where attention has been paid by the proprietors and their agents to the state of the tenantry, and a mutual feeling of security and good will prevail between the parties. The want of sufficient capital, poverty, and the insecurity of tenure, prevails to such an extent, that the Irish farmer is denied the comforts and conveniences which are enjoyed so amply by the same class in England, Scotland, and other countries; and we fear they will continue in this state, so long as the causes that produce it remain in operation. The poor man is glad to obtain a spot of ground of any kind, upon which he may afterwards clump up, as best he may, a wretched hovel, without comfort or convenience, and with this unseemly, and, in most cases, filthy, confined sty, he must be contented. And it is not altogether his philosophy or patience that renders him so—he has been reared to such, he knows no better, nor does he in many cases desire a change; habit has rendered privations familiar and almost unnoticed, which to men under different circumstances would be absolutely insupportable. On commencing an Irish farm, therefore, we find housing of the very worst description, and being scanty of the means to improve, we must just make an effort to make the best of a bad job, to improve the housing by degrees and according to our means.

But a prudent, intelligent farmer, will not involve himself in such a dilemma; he will first be convinced that he has the means, sufficient encouragement, and security of tenure, or what is better still, that his landlord shall erect the housing, of a sufficient and commodious kind to suit the farm; where this is the case the old housing may in general be levelled with advantage, and a new situation and plan adopted.

The dwelling-house ought to be of a moderate size, convenient, and commodious; it is absurd to build large

expensive habitations for farmers and their families. Gentlemen with money may please themselves in extensive villas, but the farmer ought not to sink his capital in such; a large house requires much and expensive furniture, which also sinks stock, which ought to be more actively employed. The farmer with a fine house and furniture will have many friends and visitors; it may be quite pardonable to treat such to a meal or a cup of tea, but it might also be very convenient to be able to regret the want of accommodation in a spare bed during the night.

The offices ought to be capacious according to the size of the farm, particularly the cow-house and its appendages, abundance of room for cattle, young and old. A moderately sized stable and barn, with a straw loft attached to prevent the necessity of throwing out straw after being thrashed, and which may be used instead of hay if necessary. A small harness room is also necessary, with extensive piggeries, (*having a southern aspect*;) and if sheep are kept, a yard with sheds for them. There must also be a rather extensive cattle yard, into which the beasts can be turned to exercise and get fresh water, summer and winter. A convenient and *clean* dairy is an indispensable adjunct to every farm establishment, and this ought to be situated in a cool and airy place, at a distance from the dung heap and all filth, at the same time, not too far from the cow-house. To these must be added houses for potatoes, fuel, tools, fowls, &c., with sheds for carts, cars, implements, turnips.

Perhaps the best form for a farm-house and offices, is the parallelogram, the farm-house being the south side, with a garden and shrubbery in front, a stack yard in the rear, the barn, &c., being the north side; east and west being cow-houses, calf-houses, stable, and other offices, with piggeries, open sheds, &c., &c. In rear of the cow-houses, a capacious dung pit. The yard enclosed by the housing ought always be clear, and kept clean, for the facility of travelling to the different houses, and getting through the work quickly. This ought to be particularly kept in view in laying off and

planning offices. There ought to be no dung, lumber, or other rubbish allowed in the yard. A dung pit in centre of such, is filthy and inconvenient in the extreme. The house and offices at Glasnevin are both convenient and commodious; the plan, extended or diminished, might be convenient for all purposes. The whole premises ought to be so planned, so that they could be secured at night by a lock-up gate.

The proper situation of the housing, where at all practicable, is *the centre of the farm*, or as near to that as possible. This arrangement, however, will be interfered with by several circumstances—the proximity to roads, to a sufficient supply of water, &c., &c. This latter necessary must be in abundance, convenient to the housing, summer and winter; and in all cases, a centre road leading to every field, and to the housing, will be found most convenient, almost indispensable. The refuse stones, collected regularly from the different fields, will be sufficient to keep it in repair.

The site of the housing, garden, and centre road being determined on, and laid off, the next point is to lay off the fields, in number according to the rotation or rotations determined on, and this will also require much consideration, skill, and judgment. In this matter a few points must be strictly observed. The farm ought to be fairly divided, with a like quantity of land in each field. Every field on the farm, or as many as possible, ought to be in shape a parallelogram, and if triangular or point fields are unavoidable, they ought to be at one or both sides of the farm. It is unseemly and inconvenient to have point ridges in every field, and such may be avoided by a little skill. If there be a straight mearing fence, running *north and south*, begin there and lay off the fields and fences parallel to it. But if the mearings be crooked, or run in a wrong direction, begin at the centre, in some convenient place; run a line of fence north and south, and from this line lay off the fences, and fields, right and left; by which the point ridges will be confined to, at most, two fields. All the ridges in the farm must run north and south, or nearly so. The sun rises on one side, sets on the other,

and at the meridian shines upon the whole. By this means the crops vegetate, and ripen alike on both sides of the ridge.

---

## CHAPTER XX.

### GENERAL CULTIVATION.

It will now be necessary to give a brief outline of the cultivation of a farm during a year; of the several common and necessary crops usually raised, and which course of cropping may be repeated by rotation for any number of years, or changed according to circumstances.

It may fairly be presumed, as a general rule, that the lands and farms in Ireland are in an unprofitable and neglected state, requiring a course of permanent improvement. There may be instances to the contrary, where judicious cultivation has been adopted, and the soil brought into a productive state, but such instances are merely rare exceptions to a general rule. We find the land wet, shallow, dirty, and poor, and before we can get into any profitable rotation or course of cropping, we must make an effort to correct this anomalous state, and put it in a favourable condition for cropping and after management. The sooner, therefore, that we can drain, deepen, clean, and manure it, the sooner will we find ourselves in a position to extract the natural produce of the soil, be repaid for our expenses on such permanent improvements, and find ourselves comfortable and thriving. But this must be a work of time, of years. Few of the occupiers in Ireland are in circumstances which will enable them to accomplish such a task, and permanently improve their farms in a year or two; a gentleman or capitalist may do so, but of this latter class we find few inclined to risk their property in such an undertaking, nor is it necessary that it should be the case. How frequently have we seen men of substance, commencing on an extensive scale, with,

in many instances, more cash than skill; endeavouring to do too much in a short time, met by what every farmer must expect, adverse seasons, and other circumstances. Such sanguine spirits in our country are very subject to change of temperature—from high expectations to low despondency. They have not energy and perseverance to meet unexpected difficulties, and in general, in a year or two, throw up the whole project in disgust, having done more harm than good,—injured themselves, and confirmed their neighbours in their indolent and bad habits.

Permanent improvements, to be carried out successfully, must be undertaken with prudence and determination, and on a moderate scale, say a certain portion of the farm—one or two fields, according to means and circumstances, in a season. But in every case, whatever portion is to be so improved, let it be *completely done* before another part is entered upon, even though the remainder of the farm may be for a time comparatively neglected. To commence the management and cultivation of a farm as we generally find the farms in Ireland, whether they may have been in former cultivation, in pasture, or waste, and attempt to make the land pay by the usual course of management—pasturing a few cattle or sheep, summer fallow, stretching a small quantity of indifferent manure over a large space of ground, and depending on grain crops. Such a course will never pay either landlord or tenant; the true and eventually prudent and profitable course will be, commence with one field, thoroughly improve and enrich it, proceed to a second and a third, and get into a judicious rotation; accordingly in a few, three, four, five, or six years, the whole farm will have been gone over, and brought into such a state as, by proper cultivation afterwards, will pay both landlord and tenant.

The best mode that we have ever adopted or seen tried, for the purpose of bringing a field into fine cultivation and high condition, is, along with the permanent improvements, draining and deepening, the taking of two green crops in succession, say potatoes first, and turnips, mangel wurzel, &c., afterwards; these crops

followed by a grain with grass seeds. This will be the best commencement of any rotation. For carrying out this plan speedily and efficiently, it will be necessary to have the land in possession early in autumn, or better in the summer months. The usual time of entering on a new bargain or tenure in this country, is November; but the incoming tenant, if possible, ought to get possession early in autumn, when the previous crops have been removed. A month at this time will give great facility for accomplishing the purpose best. We would, during the summer, autumn, or early winter, commence to drain the field, to run *deep* drains through all the hollows, and parallel drains up the face of the slope, where under water or springs appear. At the same time, prepare for a crop of potatoes, in ridge or lazy bed, as it is usually called. If there are coarse aquatic plants, an uneven surface, with or without peat, let the inequalities, with a portion of the surface, be taken up in sods, dried and burned. This will make excellent manure for either potatoes or turnips, particularly if carried to the housing, saturated with liquid manure, and mixed in the dung heap. If there be stones on or near the surface, let them be applied to drainage, or an excess carried off. During the cultivation of the ridge potatoes, a quantity of stones may be obtained, and extensive drainage carried out in the furrows. The ground must be levelled and loosened either by plough or spade, or both (we would in no case recommend planting on the lea sod). Let the ridges be laid off at any convenient breadth, say four feet ridge and two feet furrow, or six feet ridge and three feet furrow; that is, two-thirds of the land in ridge and one-third in furrow. This will give sufficient cover, and when the potatoes are shovelled, one-third of the land will be trenched eighteen inches deep, and the subsoil exposed to the atmospheric influence. But we ought not to rest here. We should take the subsoil fork or spade, or a *one-horse* subsoil plough, and deepen the furrow twelve inches more, allowing the subsoil to rest. This will give us thirty inches subsoiled. Our drains should all be so deep; that the spade or plough would not disturb them, and

we should then have parallel drains in every furrow, discharging into the main drains, which in very many situations will be found quite sufficient to dry the land. A great prejudice exists in some quarters against the ridge, or lazy-bed system of planting potatoes, and many very silly objections have been urged indeed, but, as usual, by persons unacquainted with the whole subject, and not having an opportunity of seeing a lazy-bed *properly* managed; but let the ground be well prepared, digged, or ploughed, well manured with dung, ashes, lime, or guano, the potatoes planted *whole*, and straight in rows across the ridge, and from fifteen to eighteen inches apart in the rows, well covered, and again shovelled at a proper time. When the young stalks are six inches over ground, let the grope spade be taken, and dig *across* the ridge between the rows, loosening the earth, cleaning thoroughly, and moulding up. A field of ridges so managed, will be better cultivated, as well cleaned, and in general as productive a crop as the best drills. We believe that in our climate and soil, on an average of years, the ridge potatoes, properly cultivated, will excel the drills in quantity, quality, and the condition of the ground for other crops. The excellence of the crop in either case entirely depends on the management, manure, and quality of the soil.

It is quite obvious that there must and will be a great change in the mode of managing and cultivating the potato in this country, if we intend to retain it in health and vigour as a safe and remunerative crop. It is extremely desirable that it should be so, on all accounts, not alone from its feeding qualities, but also from its being favourable to prepare the ground for any other crop that may succeed it. This has led to its too extensive cultivation; and its general health and hardiness has produced that extreme neglect with which it has been treated, and which has at last impaired its constitution, and rendered several kinds in different localities weak, diseased, and liable to failures during many years. We do not mean or allude to the dreadful disease or blight of last season, which we attribute altogether to extern atmospheric causes, and which we

hope never again to experience;\* but we speak of the failures in the crop of a different kind—a progressive disease induced by bad treatment and injudicious culture—a malady that may be met and eradicated by an entire change of system; and one of the most important changes for the better will be the time of planting: this has induced us to treat of the culture of the potato at this part of our course.

Hitherto the best season for planting the potato has been considered the month of May, or even through June, when the weather is dry and the ground parched, the soil undrained, hard, foul, and in lumps; no fine tilth to cover and cause a quick vegetation; the manure applied immediately over or under the cut, and tender seed. This seed, in most instances, taken from a pit in the field, or a heap in the house, where a great mass had been laid together in the autumn, damp and fresh from the ground. This induced an incipient fermentation, and a premature vegetation. The tuber expended its energies on the first shoot, which, in the handling and preparation for the ground was broken off. The enfeebled tuber again, by a false economy, divided into a number of sets, and these, with their fresh cut surface, brought into contact with fermenting manures. If there were the least disposition in the set to decompose, it would be admirably advanced by the manure. We will not wonder, therefore, that by such treatment and management we had failures in our crops, and a general disposition to delicacy. Besides, we have been propagating by the tuber for perhaps half a century, instead of by the seed, the natural course. It is not surprising that certain kinds become deteriorated, delicate, and worn out.

A great change must be adopted in our course of culture, and in many respects. We must dry and deepen, clean and pulverize the soil better than we have done, and we must change the *time of planting*. We are not

\* Since the above was written, the disease has again appeared, and we have had occasion to change our opinions on the cause; our present opinion is, that it originates in the seed, is conveyed from thence to the roots, stem, and eventually the leaves and young tubers.



prepared to say that autumn planting is the best, and will become general. In mild winters, and with particular kinds of seed, this mode has succeeded well; but in a dry, warm soil, the early kinds will vegetate too quickly (that is, for a general crop), will be cut off or much injured by the late frosts in spring. The late kinds, however, will not in general come over ground too soon, and may be safely planted at that season.

Whether the seed be planted or no, we would strongly recommend that the ground should immediately after harvest, or as soon as convenient, be ploughed, cleaned, and the manure either be ploughed or dugged in for the succeeding potato crop. It may be drilled in the usual way, and the potatoes planted any time during winter or spring that may be thought prudent. Ground so prepared will be dry, and the planting may be performed in almost any kind of weather. Where house-feeding has been adopted, there will always be abundance of manure in the autumn for the purpose, and the sooner it is covered in the ground the better. We have no hesitation in saying that the ground may be so prepared for turnips, mangel wurzel, or any of the green fallow crops, at that season, and with great advantage, merely drilling in with the seed in the spring a small quantity of guano, or other fine manure, to produce quick vegetation. This course is particularly favourable for beans; let the ground be drilled and manured in the autumn, the seed may be put in with the hand hoes early in February, or in fact any time during the winter or spring.

We tried an experiment last autumn at the Model Farm on this subject, and which, according to present appearances, promises to be completely successful. Seeing the progress of the potato blight, and being apprehensive that all would be rotted, that there would be none in the present year, and being determined to have a crop of *some kind* on the ground—immediately after harvest we ploughed, cleaned, and drilled up the field, which we intended for potatoes, being also provided with a crop of early cabbage plants in seedling beds, we planted them out in the drills, eighteen inches

apart, the drills being twenty-seven inches wide. This was done in the months of November and December. In the latter part of February and beginning of March, we planted the potatoes of various kinds, one seed between each two cabbages, thus leaving the potatoes also eighteen inches apart. The mode of planting was this: one man with a spade opened a space between the cabbage plants, about four inches deep, loosening the earth, and throwing out any roots of weeds; a boy then followed with a tin can containing powdered quick lime, and a basket with potatoes; with an iron spoon he threw in the space a small quantity of lime, likewise a seed potato, a third followed with a spade or shovel, and covered up the potato, moulding the cabbages at the same time; and while we write, on the 20th of May, we are taking off a fine crop of cabbages for house use, for cattle and for market, and the potatoes are over ground, strong, vigorous, and a beautiful crop. We do not say that this is the best mode that can or may be adopted, but it is a mode that will secure a crop of potatoes in ordinary seasons, and a valuable *stolen* crop of cabbages at the same time; and if potatoes put in thus early, show delicacy or a disposition to fail, the ground may be replenished with a crop of mangel wurzel or turnips. We may fairly predict that when superior culture becomes general, manure made in the proper time and manner, that land will be prepared for these crops in the autumn, the manure deposited and potatoes planted at least before the end of April. With these precautions and a due regard to the care and selection of seed, we do not despair of still retaining this most important and remunerating crop.

In regard to the selection, preparation, and management of seed, and the various diseases attending the potato, so much has been spoken and written, so many ridiculous fallacies have been promulgated and exploded, that great caution is required in giving any substantial and correct opinion on so complicated and obscure a subject; yet we presume there are a few well ascertained facts and principles, upon which the intelligent and judicious portion of the farming community are

agreed. There is certainly a good deal known, though there is much yet to be discovered. It is, for instance, pretty well ascertained that the new varieties, which appear occasionally, raised from seed, are healthier and more to be depended on than the older kinds, those that have been long in cultivation, in the same locality. We recollect several kinds, some twenty even fifteen or ten years ago, that were excellent in quality, productive and quite favourites; these have disappeared and been superseded by other, newer and better kinds. It is also well ascertained that the newest and best varieties soon deteriorate and become uncertain, if cultivated on the same farm or quality of soil during a number of years; we therefore ought to change our seed at least every two or three years, and we should endeavour to change the soil also, to bring seed from a light to a heavy, or from a heavy to a light soil, from a peat to a sandy or clay soil is a very judicious course, and if possible not alone with the seed of the potatoes, but others, we should always bring it *from a poorer to a richer soil*.

Preserving the seed during the winter months, is a matter of great importance, and in general, badly attended to. They will not be safe in large pits in the field, nor in the house. Perhaps the safest way to preserve seed is in the ground, allowing them to remain until the spring, or when required, taking care to cover them from the frost and light. The ground must be perfectly dry, the ridge or lazy bed is the best plan. If taken out in the autumn, they ought to be pitted in dry ground, placed in layers, mixed with a little light earth, and covered loosely over. In this way, no premature vegetation will take place, as in the large heap or pit.

In selecting the seed we prefer the medium size, and generally plant them whole; we do not use the largest and we altogether reject the smaller. By planting the very small ones, they will soon deteriorate. The very largest will produce excellent seed, but must be planted far asunder. The largest crop we ever raised was from the large potatoes planted whole, and three feet apart.

If potatoes are planted whole, they must get room, otherwise the produce will be a small, numerous, but inferior progeny. We always plant at from fifteen to eighteen inches asunder, allowing from twenty-seven to thirty inch drill. There can be no objection to cutting healthy sound potatoes for seed, but if they are not so, they will be liable to failure. In the after culture and management of the potato crop, all that is required is, to keep the land loose and clean, destroying the weeds, and allowing the air to pass freely in. The ground must never be caked, or bound up to exclude the air; if it is, the crop will soon suffer. It is a great mistake to heap too much earth up to the stems, and over the roots of potatoes; in rich ground it increases the foliage at the expense of the tubers. We seldom introduce the moulding plough among our potatoes after covering the seed; we rather loosen the earth clean, and mould up at once with the grope spades.

In the autumn, the potato crop ought to be taken out early; it is absurd to leave them in the ground until they are what is called ripe, that is, until the stalks wither. If the crop has been put in at the proper season—from February to April, all the common kinds will be ready for raising by the end of September, the earlier kinds sooner. Those intended for seed should be planted late, and raised early, if raised at all, before they fully ripen. The early potato raising is judicious and necessary on several accounts, but particularly, that the land may be prepared, by future cultivation, for other crops.

We must now revert to our former subject of permanently improving the land, cleaning, and bringing it to a high state of cultivation; and we have gone so far as the potato crop, which ought to be in the first instance put in ridges. When the crop is raised complete, drainage can be carried out in the furrows, and the ridges trenched, or subsoiled, according to the plan pointed out in the chapter on subsoiling and deepening. In the spring, say the first of April, the ground will have been acted on and ameliorated by the frosts and atmosphere, and should now be harrowed and cross-

ploughed; or on the small farm digged, reversing the soils, and mixing, and by the middle of the month prepared for mangel wurzel, which ought to be sowed about the fifteenth. The best manure for mangel wurzel is very rich compost, dung and earth well mixed, early in the former season, and a liberal allowance supplied. A great deal of the early vegetation and success of the green fallow crops, depend on the state of the soil when the seed is deposited. If it be coarse, lumpy, and stiff, there cannot be expected a quick and abundant vegetation, but if loose, friable, mouldy, and comminuted, the seed, if good, will quickly sprout, grow rapidly, and a fair, or superior crop, may be expected, if the manure and after culture be equivalent.

We usually draw out the drills for mangel, twenty-seven inches wide, and we deposit the seed, and thin out so that the plants may stand from fifteen to eighteen inches apart in the drill, according to the quality of the soil. Along with the seed of turnips, mangel wurzel, carrots, and parsnips, a small quantity of some stimulating manure ought to be deposited, such as guano, bones, or some artificial substance, for the purpose of promoting a quick and vigorous vegetation.

If guano be used, great care must be taken that it does not come in immediate contact with the seed, for in such case it would destroy its vitality, and a missed crop would be the consequence. The mode by which we sow our mangel wurzel, is the following. After the manure has been covered in the drill, one person goes with a long toothed garden rake, and levels the top of the drill *slightly*, raking off all the lumps, making a fine and even surface; another follows with a common turnip hoe, and opens small spaces, at twelve, fifteen, or eighteen inches asunder, according as the soil is rich or otherwise, and as we expect to thin out the crop. The open should be one and a half inch deep for turnips, and one inch for mangel, but if guano be used there should be an additional half inch in depth; the guano should then be deposited, and with the hand, say half an inch of earth, from either side, drawn over it. Another person follows, and deposits three or four seeds

of mangel, or a pinch of turnip seed, and the fourth person, with a draw hoe, covers the seed carefully with fine earth—one half inch deep for mangel, and one inch for turnips. Any other fine manure, such as ashes, bones, &c., may be deposited in the hollow along with the seed, and one person may do both. After covering, the top of the drill must be rolled or consolidated by a light roller. The heavy roller ought never to be used on the top of such drills; the back of a spade will do the thing perhaps better than any other implement, but is more tedious than the roller. We have a small roller for the purpose, which a man or boy can draw along the drill with great ease. This is decidedly the best and surest way of sowing mangel, and also turnips. We have never experienced a failure by this plan; we have always secured a speedy and sure braird. Nor is it so expensive or tedious as may be supposed; four boys or women, in a day, will sow a statute acre of ground, and the superior crop will pay the extra expense. On extensive farms, the drill machine may be necessary, but in general, the Irish farmer preparing the ground, opening the drills, and covering the manure by degrees, will accomplish his purpose quite speedily enough without such. The ground should not be allowed to get too dry when green crops have to be sowed; the drills ought to be opened, the manure deposited and covered in, and the seed sowed on the same day. If a large space of ground be drilled up in a dry spring, and left so for days, all damp will be evaporated; the seed will lie in such a dry bed for weeks or more, until rain force it up. It may come up in detail, sickly and thin, will be picked up by the grey linnets, or cut off by the fly, and the crop eventually a failure. A degree of damp and moisture ought always to be present in the ground for such seeds. It used to be a common and necessary practice, to turn over the manure intended for green crops a few weeks before being applied, in order to induce a new fermentation and heat in the ground, and to promote a quick vegetation. But a better method is, to drill in with the seed, a small quantity of some portable and stimulating manure, such as guano, &c.

At the Model Farm we make an excellent substitute for guano, which suits our purpose well. In a cesspool where drainings from the water-closets, soap suds, and other strong liquid manures accumulate, we throw the wood, coal, and other ashes daily. This is occasionally cleaned out and kept in a heap for a time; it is spread out, dried, and riddled, the fine portion kept for use, and applied with our small drilled seeds, such as mangel wurzel, turnips, carrots, parsnips, cabbages, beans, peas, &c., &c. A sufficient quantity of this, drilled in with the seed, will produce excellent crops, equal to bones or guano, and much less expensive. In the neighbourhood of bogs and mountains, where plenty of peat ashes may be obtained, this steeped in, and treated with strong liquid manure, will produce excellent crops of all the variety of vegetables we have mentioned.

Guano and bones are good substitutes for farm-yard manure, but will never equal that important substance; we have fairly tested their qualities in producing various crops. We have tried six cwt. of guano, forty bushels of bones, and thirty tons of farm-yard manure to the statute acre, each, and have always found the farm-yard manure to produce the healthiest and heaviest crops. These are the proportions in which we would always use them. We have seen much less tried and recommended, but on medium soils all that we have stated will be necessary. Bones dissolved in sulphuric acid, has become a favourite manure, but care must be taken that the acid is sufficiently neutralized before being applied. This mixture should be absorbed by ashes, and applied to the soil in that state.

It is a matter of much uncertainty, and some difficulty with farmers, to ascertain the proper quantity of guano or bones, which ought to be applied to a smaller portion of a drill—a square foot, a square yard, &c.; but by consulting the agricultural tables in “The Farmer’s Ready Reckoner,” the exact quantity will be readily found.

The first or second week in April is the proper time to sow the general crop of carrots, (some incline to sow earlier). The Belgian carrot is the best for horses. The land should be loose and well deepened, and the manure in liberal quantities, ploughed, or better, digged

in during the autumn. The soil again well broken and mixed in the spring; the seed at the rate of 5 lbs. to the statute acre, drilled in at eighteen inches apart. These drills may be opened with a line and turnip hoe, or a small one-horse plough, about one and a half inch deep, a quantity of stimulating manure applied along with the seed, covered with a rake, or light harrow, and afterwards rolled.

There are various kinds of mangel wurzel cultivated at present in the United Kingdom, but the long red and yellow globe are decidedly the better, and produce the larger crops. The yellow globe is the best quality for feeding, and on a variety of soils will produce the largest crops. On deep light loams, or peat soils, the long red is the better. The great excellence of this crop is, the large quantity of feeding, for cows and pigs, which the refuse leaves, during the summer and autumn months, will produce; but great care must be taken not to strip the stem too much, otherwise the root will be seriously injured. Those that are fresh, green, and in requisition, ought not to be disturbed, but the leaves that have done their duty, and inclined to decay, should be removed. The decayed foliage being taken away will give more air to the plants below.

If sowed as we have directed, 2 lbs. of the seed of mangel wurzel will be quite sufficient for a statute acre, and the same quantity of turnip seed for the same space; if the turnip sowing machine be used, some more may be necessary. We have always steeped our mangel wurzel seed forty-eight hours in strong liquid manure, and dried with powdered lime, or gypsum; this produced a quick and healthy vegetation. We hear great complaints of the fly, and other casualties attending these crops, but if proper attention were paid to the state of the soil and manure—cleaning, breaking down, preserving moisture, selecting good seed, and using a little stimulating manure when it is deposited, all such pests would become matter of history.

Parsnips are also an excellent and valuable crop when well cultivated in favourable situations, particularly for the feeding of milch cows. They should be cultivated as the carrot, and sowed about the same time—late in



March, or early in April, according to the weather and state of the ground.

We have before alluded to the cabbage, and we would again particularly draw the attention of the farming community of all grades to this most important crop. This early attracted the attention of that most acute observer, the late William Cobbett, and though we are not quite prepared to go the full length with him, as to its extreme merits in feeding cattle, yet from considerable experience, we are bound to say, that as an excellent food for man and beast, as a most productive and highly remunerative crop, few, if any, of our present cultivated field crops can exceed or equal it. There are such a variety of kinds suitable to all soils and seasons, that by a judicious rotation, and careful culture, we may have them available throughout the year.

The early york and nonpareil, planted in October, November, and December, will be fit for use in April, May, June, July, and August. These early kinds may be succeeded by barley, with grass seeds, or Italian rye-grass, which will produce at least two cuttings in the after season; or even potatoes, rape, turnips, &c., &c.; or with the late kinds, savoy, broccoli. And again the late kinds, flat Dutch, and drum head from seedling beds, planted in March, April, May, and even June, will feed through the late autumn and early winter months, they may by care be kept and stored to spring. The broccoli and Scotch kail are delicious food through both winter and early spring, and we know, by long experience, that no kind of food that can be given to milch cows during autumn and early winter, will produce a greater quantity or better quality of butter than those cabbages; even for fattening stock, they are fine, and for ewes and lambs, or ewes with lamb, they will be found excellent. We have long hesitated as to the merits of a crop of cabbages or turnips, in point of value and feeding qualities, and our present opinion is, that, looking at the case in every point of view, its almost universal application as the food of man and beast, it may rank with the best turnip crop.

We now come to the general turnip crop, and the cultivation of these ought to immediately follow the

mangel, carrots, cabbages, &c., &c. The usual course of spring culture is, after sowing the mangel about the fifteenth or twentieth of April, to commence and put in the general potato crop, and this occupies the time until the middle of May, or even further. Then prepare the ground and sow the Swedes, which cannot be accomplished properly before the first or second week in June; the Swedes succeeded by the late kinds—the Aberdeen, globe, &c., &c., which was continued through June and July. Now we are decidedly of opinion, that a great change for the better might be made in the whole system of green crop culture, and particularly in the season at which the different crops ought to be put in. The season for each being earlier than formerly, we would strongly recommend that the potatoes should be planted before the spring corn, oats, barley, &c., are sowed, or at least about that time; that immediately after the grain has been sowed, the ground should be cross ploughed, cleaned, and prepared for the green fallow crops. Carrots, parsnips, cabbages, and mangel should all be in the ground by the fifteenth or twentieth of April, and the sowing of the Swedish turnip should immediately follow, and be finished by the fifteenth or twentieth of May.

If Aberdeen or other late kinds are to be tried, they may follow the Swedes. This course, we are convinced, will add amazingly to the quantity and quality of the several crops, will expedite the general culture, cleaning and management of the land, and be advantageous to the farmer in a variety of ways. It may be objected, that mangel wurzel and turnips, if sowed too early, will run to seed in the autumn and winter; but this objection we know to be futile: the early season, and the early crop of almost every description, is universally the best. Last season we sowed Swedish turnips about the fifteenth of April, and some about a month later, and we found the early crop, in the same field, the same quantity and quality of manure, to produce eight tons to the acre more than the late crop, and they had no greater disposition to run to seed than the others. All the various kinds of mangel will run to seed, more or

less, and the best remedy for this is to allow two or three plants to stand in the same space until we may be able to allow those to remain which show no disposition to shoot; the others, when taken up, will be highly useful at the season for pigs, calves, &c.

A great deal of the success of the turnip crop will depend on the culture and condition of the soil, irrespective of the manure; it ought to have been ploughed in early autumn, and if necessary, trenched or subsoiled. In the early spring, it will be loose, friable, and easily broken down, easily cleaned of all root weeds. If the weather be dry, it ought to be harrowed and rolled, afterwards cross ploughed, again well harrowed, rolled, and broken, and brought into a fine state of tilth. It may be necessary, in many cases, to plough a second time in the spring, to clean and sufficiently pulverise, and if the season be dry, to leave the ground rolled down, until the drills are to be opened for the manure. This last operation—opening the drills, depositing the manure, covering in, and sowing the seed, ought to go on simultaneously; no more ground ought to be opened than can be conveniently manured, covered in, and the seed sowed on the same day. This will prevent the evaporation of the necessary moisture, and promote an early and vigorous vegetation. The best turnip at present in cultivation is Skirving's improved Swede, both in regard to weight of crop and quality; but a great variety of inferior and spurious kinds are sold under that designation. And as much depends on getting the genuine article, it ought to be obtained from Mr. Skirving, or some trustworthy and respectable seedsman. Any farmer may save his own seed, and what he can depend upon, by selecting a few of the best bulbs, and transplanting them in a convenient spot, in garden or field. The seed when ripe ought to be cut, and preserved, the same as cabbage or kail seed. Due caution, however, must be used, that no turnip of a different kind be seeding in the same field or neighbourhood, or even cabbage, or any of the brassica tribe; if such were the case, the bees will carry and distribute the pollen, and the seed will be hybridized.

If the sowing machine be used, the coulter ought to be regulated so as to sow the seed deep, an inch or inch and a half will be necessary; this always produces the strongest and even the quickest vegetation. It is in all seasons or soils a most erroneous practice to sow the seed on or near the surface of the ground, or far from the influence of the manure; three pounds to the statute acre is quite enough of seed, but if put in with the hoe in spaces, the one half of that quantity will be sufficient. We have this season sowed all our turnips with the hoe, and we have not used more than one pound to the acre; the saving of seed will go far to pay the extra labour, and we are always sure of a hit crop. The best possible way to raise a crop from guano, bones, or other pulverised strong manure, is to open a hole at the space required, ten, twelve, or fifteen inches; if for guano, deep, say two and a half inches, then let the required quantity be dropped into the hole and covered with fine earth, at least half an inch, and then the seed deposited, covered in, and rolled; if bones or any other artificial manure be used, this latter precaution of covering with earth, before sowing the seed, will not be necessary. The seed of turnips or mangel wurzel ought not to be pressed down with a very heavy roller, we have a small hand roller which answers the purpose well, but on a small farm the back of a spade will do the work admirably.

It is now well ascertained that no turnip can at all compete with the Swede, in point of value and feeding qualities, and our present opinion is, that no other ought to be generally cultivated, unless in some instances, where the ground cannot be got ready or prepared in time for it. The next in importance, is, the purple topped Aberdeen, or Bullock, Dale's hybrid, and the globe; the latter will rush up into a large quantity of inferior feeding in a short time. The late sowed kinds are generally used for the late autumn and early winter feeding, but if the Swede be sowed in time in April, it will be ready for use in the latter part of October and beginning of November, and will be a much more substantial and profitable crop. There may be instances

where soils are favourable to the growth of the inferior turnips, but these are only exceptions to a general rule. The quantity of seed and mode of sowing these late kinds, are the same as the Swede.

---

## CHAPTER XXI.

### AFTER CULTURE OF THE GREEN FALLOW CROPS.

FROM our preceding remarks it will be perceived, that there are a few most important and prominent points to be kept in view, in the preparation of the soil, the manure, and the early culture of the green fallow crops. The land ought to be well drained, and deep cultivated, early ploughed, well pulverized, and cleaned of all the roots of weeds, the manure of good quality, and in abundance, the seed good and carefully deposited; if these leading points are carefully attended to, the success of the crop in ordinary seasons is certain. In like manner, in the after culture, there are a few essential points which, if not attended to, may render all our former trouble and expenses abortive. Often do we find good land, in good condition, with plenty of excellent manure, sound seed, vegetating in the proper time, and promising a fair or even abundant crop; afterwards neglected, mismanaged through indolence or ignorance, or both, the young and tender plants forcing their way through a stiff, indurated soil, or smothered with a crop of weeds, curbed and stunted in their early growth, and eventually a decided failure. This the farmer will attribute to the crop, the season, the unfavourable soil, to everything but his own ignorance and neglect, and will throw up in disgust this "new fangled doctrine of green cropping." The after management therefore will require the strictest care and attention, not alone for the success of the crop, but for the improvement and proper culture of the soil. It is in this respect, that the introduction of these crops is such an important era in the general

management of our land; these crops well, cultivated, supersede the necessity of the bare summer fallow, the land obtaining all the advantages of cleaning, pulverizing, and at the same time produces a valuable crop, in the same year, to add to the fertility in future seasons.

There is nothing difficult or mysterious in the after culture of these crops, the matter is simple in the extreme, but must be sedulously attended to. There are two points that must be strictly kept in view,—*first, the soil must always be free, loose, and open; secondly, every vestige of a weed must be eradicated.* If the ground is allowed to harden, or a scurf to form on the surface, the air cannot then penetrate, all the various operations of nature in the soil are partially suspended, and the crops will suffer accordingly; but if the soil is frequently stirred, such cannot happen, the atmospheric influences have free access, and in all weathers; this will keep the crops in a healthy and thriving condition.

There is a very absurd and prevalent opinion among our farmers, that it is improper to stir and loosen the ground among potatoes and other green crops during dry weather; they say by such stirring, “the drought gets into the ground and injures the plants.” There could not be a more pernicious doctrine inculcated or acted on than this, for the very contrary are the facts. It is in and during dry weather that the loosening, opening, and cleaning ought to take place; if the soil be in a proper condition it will be absorbent of moisture from the atmosphere, and it can only be so when the surface is loose and friable, and can admit the air; every portion of air carries a portion of water along with it, and this moisture in the air is more generally diffused, and in greatest abundance in dry weather, and of course of the greatest benefit to the soil and crops. It is only on a few of our light, sandy, or gravelly soils that we would be justified in setting a foot during wet weather; were we at such times, on our heavy or even medium soils, to go with man and horse among our green crops, we would be doing more harm than good, making the land into the consistence of brick when drought would return; besides, it is altogether out of the question to attempt

the destruction of weeds in wet times. The hand or horse hoe, or both, ought to be kept frequently going, stirring and cleaning the soil during the early growth of the green crops, and this efficiently done will be generally sufficient to keep them in order; whenever weeds make their appearance on or among the drills, this work should be going forward, and it is not sufficient to merely stir the surface, the ground at least once in the summer ought to be gone into and stirred deeply. One portion of these crops, potatoes and the cabbage tribe, require to be earthed up once in the season, besides being several times hoed and cleaned—but in earthing up potatoes in general, great errors are committed: a large quantity is heaped up, and at different times, this on all soils excludes air, and on rich land promotes the growth of stalk to the prejudice of the tuber. A very common, and we think erroneous mode of the after culture of the potato is practised in general where the drill system prevails; that is, at a certain period of their growth, when the stalk may be six inches high and the tuberous roots have extended latterly on each side of the drill, to strip them with a plough, running close to the roots, afterwards harrowing between the drills and moulding up; there can be no doubt that in such cases many of those lateral shoots are cut off by the plough, and a serious loss in the crop is the consequence. There can be no objection to horse hoeing, loosening, and cleaning between the drills early, but in the latter stages of their growth, any such implement is likely to do more harm than good. The hand hoe and grope spade, are beyond all comparison the best implements for the after culture of the green fallow crops, and we believe the superiority of the crop and clean state of land after such management, will do more than pay the extra expenses, particularly in this country, where labour is abundant and cheap. We cultivate all such crops on the Model Farm in this manner; if we use the horse hoe at all, it is early, and in the centre of the drill, merely to stir the soil for the spades, and kill any weeds that may appear; after thinning out and spacing the turnips and mangel wurzel, and when the potatoes

are well over ground, we hand hoe them carefully, going pretty deep between and around the plants, loosening the earth and destroying all weeds. At the end of a few weeks, when they have sprung up, and are beginning to stretch across the drills, we go through them again with the grope spade, digging deep between the drills, between and even under the plants, without disturbing their roots, eradicating every weed root and branch, and leaving the land clean, fine, and loose; we throw up a portion of earth as covering to the roots of potatoes and cabbages, but to the turnips, mangel wurzel, carrots, parsnips, &c., we merely stir and let it lie; this finishes the culture. If any chance weeds appear among them in the late summer or autumn, they are picked off by the hand or hoe; but such will be very rare in a field so cultivated and finished. Potatoes in the ridge or lazy bed we cultivate in the manner pointed out in page 190, but all is done on the same principle, *keeping the earth loose and clean.*

Spacing or thinning out turnips, carrots, parsnips, and mangel, requires some skill and attention; this is not generally well done, very often carelessly, which will tell seriously to the disadvantage of the crop. A *good plant* ought always to be the one selected to stand, and the inferior ones pulled out; though we ought to be as near the prescribed space as possible, we may safely sacrifice an inch or two to retain a strong and healthy plant; this matter tends more to the success and weight of a crop than is generally supposed. The common mode in Scotland and in this country, of thinning out with the turnip hoe, is certainly objectionable; the hand will do it much better, and in practice nearly as fast. The space between the plants will be regulated according to the nature and condition of the soil, and the supposed luxuriance of the crop. Turnips will stand from ten to fifteen inches in the drill, the drills being from twenty-seven to thirty inches apart, mangel wurzel about the same, or a little wider; carrots, &c. drilled on the flat, will stand from four to six inches asunder, and eighteen inches wide in the drill.

The harvesting and storing of these green crops are



now pretty generally understood, so that little may be said on that head. As we before stated, potatoes will keep best during the winter for seed in the ground, protected from frost in the ridge, or in small pits with loose earth; for regular use protected in the house from frost and light, and in moderate quantities.

Mangel wurzel must be taken up about November or before severe frost sets in; the tops will feed cattle well at this time, the roots may be stored in a shed, in a pit like potatoes, or thatched over with potato stalks and straw, frost must be excluded.

Swedish turnips do not much regard frosts in our climate, they will keep in the fields until spring or until they begin to sprout, they should then be taken up, they may be stored in sheds, being covered with straw or litter, or they may be taken up from one field any time after November, and laid in another in rows, the roots under and the tops covering, in this way they will keep until spring.

Carrots and parsnips are best stored and preserved in sand.

---

## CHAPTER XXII.

### LEGUMINOUS PLANTS.

ANOTHER species of plants, the leguminosæ, the principal of which are beans, peas, and vetches, these also class with the green fallow crops, the clovers and trefoils are classed with the grasses; the former, when judiciously cultivated, and brought into the proper part of a rotation, are a valuable addition to the usual produce of the farm, not only as remunerative themselves, but as alterative they improve the land, clean it, and almost every other crop will succeed well after them. All the different kinds of peas and vetches can be successfully raised on almost any soil, even though poor. The grey peas are grown, and sometimes wonderfully abundant on

land that has been exhausted by grain cropping, but the superior white kinds are to be preferred, and the land for all sorts ought to be clean, and moderately rich. Beans can only be successfully grown on heavy land, containing a considerable portion of clay, and on such, with manure and judicious culture, they will be found a paying crop. In different parts of the continent and even in England, these crops, beans and peas, form a considerable portion of the produce, and the food of man and beast; but in this country, though the climate and soil are very favourable, we have almost entirely neglected their cultivation as field crops. The bean has been always found an excellent and economical food for horses when bruised and mixed with oats, or ground into meal, and given in mashes with bran; in this state they form most excellent and nutritious food for cattle, calves, and pigs—and the pea meal is still better; besides, the stems or straw, when carefully saved, is relished and eaten, particularly by horses. The pea forms a considerable portion of the food of the people in England, and is highly palatable and nutritious in the form of soups, puddings, &c., and in the cities and towns when pulled in the green state; in such localities a good crop of the proper kinds for table use will be found as valuable as any other that can be cultivated. The vetch is only appropriated for soiling, or for seed, and is one of our valuable crops; it produces at an early season a large quantity of most excellent food for horses, cattle, sheep, and swine, and may be sowed in succession, so as to produce from May to November; we have cultivated this crop more than the others, its cultivation is extending, and will continue to do so, wherever it has become known and its importance appreciated.

From a common parent there has been a great variety of the bean produced, as in other cultivated plants, but the large or garden bean, and the small or field bean, generally called the horse bean are the principal; either of these can be grown in the field or garden, but the large or white kinds are generally confined to the garden, and used green for human food; the latter are confined to the fields, are allowed to ripen their seed, and are used in various ways as food for horses, cattle, &c.

There are numerous kinds and qualities of the garden bean which we need not describe, the principal of which are the mazagan and long pod. they are all excellent and useful in their line; and there are likewise many varieties of the small or field bean, the principal of which are the Horse bean, the Tick bean, and the Heligoland bean—this latter is a beautiful, productive, and favourite kind. One peculiarity of the small bean is, it is hardier than the large garden kinds.

Of the pea there is perhaps a still greater variety in cultivation than the bean, and most of them excellent in their kind, the principal of which are the garden or white pea, and the field or grey pea, but either of them will grow well by proper management in garden or field. The white kinds are esteemed for human food, and the grey kinds for animals. but green and grey kinds of superior quality are cultivated in the garden, and the finer white kinds are successful in the field, those of a dwarf habit with short stems, and which do not require sticking, are in much favour, and particularly for field culture.

Of the vetch there are two principal kinds,—the autumn or winter vetch, which is hardy and will stand the winter; and the spring kinds, which are delicate, but vastly more productive than the others in ordinary seasons.

#### CULTIVATION OF THE LEGUMES.

The modes of cultivating these plants are very simple if conducted with skill, but particularly untidy and filthy if otherwise; in the one case the land will be much improved, cleaned, and left in good condition for the succeeding crops, but if erroneously managed it will be foul, and in the very opposite state, requiring a green fallow, or cleaning crop to bring it into proper culture.

All these crops have been raised by the usual methods adopted for grain crops, viz., broad cast, and drill; but the latter is decidedly the better, and has always been more successful, particularly the beans. One peculiarity attending them is, if drilled, well worked, and cleaned, they are, like all the green fallow crops, very

favourable for cleaning, pulverizing, and improving the land; if sown broadcast, they will promote the very opposite, the growth of weeds and bad tilth. We are not prepared to deny that excellent and abundant crops have been raised from deep, rich, clean land, sowed broadcast, the land ploughed after lea, or clean oat stubble; beans will succeed in such cases. The field grey pea is mostly sowed broadcast, and the vetch almost always so. But what we contend for is, that beans and peas ought always to be cultivated like the crops of their class, by which the land can be kept clean and pulverized.

The usual mode of cultivating the field bean, has been to plough the manure in with the stubble in the autumn, ridge up and water furrow the land in order that it may lie dry until the early spring—the ridges nine feet wide; and in the spring to open four drills in each ridge for the seed, which drills will be twenty-seven inches apart; to sow the seed and cover it again with the plough; at the end of some weeks to harrow and level the ground. The sowing must be done in February, or early in March, otherwise the crop will be too late in ripening, and in such case extremely difficult to harvest and save. Several other modes of preparing the ground and sowing the bean crop have been adopted in England and Scotland, such as spreading the manure on the stubble, ploughing in and dropping the seed in every third furrow, by machine or hand; sometimes dibbling the seed after ploughing in the manure, drilling up the ground before winter, covering up the dung and seed at that time; but all these operations are more or less objectionable, and undoubtedly better modes of management will be discovered. The great difficulties attending the culture of the bean crop are,—first, it must be grown on our heavy clay soils, which are always difficult to work and prepare during winter and early spring; secondly, the bean is of tedious growth, must be a long time in the ground before it is matured and ripened, and in a late harvest is difficult to save; it must therefore, be sowed at an inconvenient time, in February, or early in March. Sowing in autumn on bean soils will always

be uncertain. If the seed is covered deep, a great portion or the whole may perish; if the plants should appear early, the cutting frosts in spring even in our climate may do them irreparable injury, therefore we must be prepared to obviate all these difficulties before we have a neat and successful bean culture. A very obvious course to follow would be, to plough up the ground for beans, immediately after the corn crop has been removed, as for potatoes, &c., clean it, deposit the dung, cover and have it drilled up until any convenient season, winter or early spring; then with a wide hand hoe, or even spade, open spaces at convenient distances, say six inches asunder, the hoe being eight inches wide, and four to six inches deep, according to the nature of the ground, in the centre of the drill; deposit the proper quantity of seed, and cover up with another hoe or shovel. These operations could be going on in any season, or on any soil, if the weather was dry above head, and women or boys would be quite competent to perform them, besides there will be a considerable saving of seed. Three bushels per statute acre is generally allowed, but by this mode less than two would be quite sufficient. Cabbages, or even rape might be introduced as a stolen crop among the beans the same as among potatoes, and removed in May, or early in June, when the beans come forward. Peas in the field may be cultivated in the same way as beans, and about the same quantity of seed will suffice. This latter mode of culture is obviously the best that can be adopted on the small farm. On the large farm, when the land is clean and rich, the most convenient mode is to plough up strong and deep in autumn, or early in winter, rid up furrows to keep the land dry, and on the first favourable weather in February or March sow broadcast, harrow well in, and cover and shovel from the furrows; even on the broadcast, weeds may be partially eradicated in the spring by the hand hoe. The after culture of the bean and pea in drills is the same as that of potatoes, frequent hoeing and loosening the soil, eradicating weeds, and moulding up once or twice; this is the advantage to both crop and soil, which the drill has over the broadcast—the ground is cleaned and fallowed, and prepared for the wheat or other grain crops.

Harvesting the bean is rather a nice point, and in late wet seasons attended with much difficulty. It is upon this ground that we endeavour to get the seed early planted, in order that the harvest may be early. They must be allowed to ripen, but in general they are allowed to stand far too long for that purpose. It is not necessary that the stalks and leaves shall be shrivelled and withered; if the seed be yellow, tough, and firm, that is quite enough. The same may be said of the pea. When ripe, they ought to be cut with a hook or scythe, and bound in small sheaves with rush or straw bands. Some pull them, but it is a bad practice; when the stem is cut a few inches above the roots, being hollow it admits the air, and this serves to dry and preserve the straw in a shorter time. They may be removed to any convenient bare field, and set up in shocks to dry, while the ground on which they grew may be prepared for wheat. When perfectly dry and *win*, they may be stacked like grain, and thrashed when convenient. The peas are easily saved; after being cut with hooks, and gathered into small bundles, they may lie for a few days to wither, being turned occasionally, and when quite dry, tied into small bunches, and stacked like beans. When threshed, their straw will be readily eaten by all kinds of cattle.

The vetch is a plant deserving particular notice, and worthy of high commendation. Its value as a soiling crop is beginning to be fully appreciated. There are two principal kinds—the winter and spring vetch, very different in their habits and dispositions. Great care, therefore, must be taken, that no mistake be made in the seed sowed at each particular season. The winter vetch ought to be sowed, from the beginning until the end of the second week in October, or as near to this time as possible; if sowed too early, it becomes *winter proud*, and will be injured by severe weather afterwards, and if too late it will also suffer from delicacy. Much of the success of this crop depends upon the winter; if mild, it will come in early and be abundant, but if severe, with long continued frosts, we must not expect either an early or abundant yield. We never

recollect seeing such large crops as at present in this country, arising from the peculiar mildness of the winter of 1845-46. This is now always taken as a stolen crop, and may be succeeded in the spring or early summer by turnips, cabbages, rape, Italian rye-grass, &c., &c. It ought always to be sowed upon well drained, deep, rich, clean land, and if convenient, manured; this manuring will be of essential service to the succeeding crops. About three bushels of seed, with one half bushel of rye, mixed, will be a proper quantity for a statute acre, and in ordinary seasons, will produce a considerable return. This crop has now met a formidable rival in the Italian rye-grass, which with careful cultivation, on favourable soils, and on an average of seasons, is by far superior in every respect—for feeding sheep and lambs, in winter and spring, for soiling of cattle and horses in the house, coming in, as the Italian will do, from one to two months earlier, and producing a succession of very superior crops; we will predict, that when the Italian becomes better known and managed, the winter vetch will be neglected. The mild climate of Ireland, however, is favourable to both, and every farmer ought to have a portion of one or other upon his land.

The spring vetch is also a very important plant, yielding, in ordinary circumstances, a large and nutritious crop. It should be sowed at the rate of from two and a half to three bushels, to the statute acre, mixed with one half bushel of oats. It may be sowed from the first of March, until the end of July, in succession, yielding good soiling during the summer and autumn. Every farmer ought to have a portion of these to come in for soiling, between the first and second cuttings of his cultivated grasses and clover, and the crop may be sowed in the same field with either of the grain crops, and with Italian rye-grass in March. After the vetches are cut off, the rye-grass will produce one or two crops. On many accounts, the vetch crops will be found of great importance to the skilful farmer, who house-feeds cattle.

## CHAPTER XXIII.

## THE GRASS CROPS.

THE third class of green crops are the grasses, including the legumes, clovers, trefoils, lucerne, sainfoin, &c., &c. This is a numerous and most important class, but so far as the farmer is concerned, may be easily classed and simplified. Many excellent and extensive works have been written on this interesting and useful species of plants, which have appeared during the past and present century, but some of these are so abstruse, and withal, so expensive, that they can be of little use to the common farmer, or agriculturist. Of late, however, some concise and useful treatises have appeared, plain, simple, and suited to both the means and the intellect of the humbler classes, and where, for a mere trifle, any person may obtain all the necessary information on the subject. One of the most useful has lately been published by Mr. Moore, of the Botanic Garden, Glasnevin, which, besides giving a concise account of the properties and uses of the principal agricultural grasses, accompanies the description with a dried specimen of each, by which means all the necessary information may be obtained, and the farmer familiarized with the various grasses in his field, without difficulty.

All the various grasses we classify into two kinds, *the natural* and *the cultivated*. Those which are in certain situations and circumstances, produced spontaneously by nature, and those which have been changed and improved by cultivation, and rendered suitable for all the different soils and situations of the country. To this latter class, the cultivated grasses, our chief attention shall be directed, as these supply the chief forage, soiling, and hay for cattle and horses during the year, and are altogether adapted for tillage farms.

The permanent pasture grasses are numerous and important on rich dry land; in such situations they will be produced in abundance by nature; on the contrary,



where the land is wet, undrained, and poor, no culture will make them thrive. In the extensive range of natural grasses, a number will be found to grow even on wet neglected land, but in general these kinds are worthless for either pasture or hay; the best of these will be found, the bent, hair grass, jointed foxtail, water whorl, water sweet meadow grass, flesh sweet meadow, white grass, or Yorkshire fog, reed canary, salt marsh meadow, decumbent heath, florin, &c. These will be eaten by cattle and sheep if better kinds are not to be had, but as improved cultivation and drainage progress, such inferior kinds will disappear, and the valuable and nutritious grasses take their place.

On our dry, rich, and kindly pastures, nature produces an abundance of the various natural grasses, leaf and stem, which supply food for our flocks and herds through the greater part of the year, one kind succeeding another through the spring, summer, and autumn months, and we have only to drain, deepen, clean, and manure the land in order to maintain this succession indefinitely. "The Emerald Isle" stands pre-eminently in this respect; and particularly on our limestone soils, few spots on the surface of the globe can compete with us in the number and luxuriance of our natural grasses. The principal of these are the crested dogs' tail, sweet vernal grass, meadow foxtail, cocksfoot, timothy, yellow oat, rib grass, rough stalked meadow, smooth stalk meadow, tall oat-like grass, the poas, the fescues, with the trefoils or clovers, red, yellow, and white; all these and a great deal more of minor importance will be produced spontaneously under favourable circumstances. In order to prove this we have only to watch the operations of nature attentively; if any portion of our land has been wet and neglected, we find it occupied by a few inferior and useless aquatic plants and grasses, but immediately after it has been perfectly drained, all these will die off and be succeeded by a great variety of the above nutritious and valuable kinds, and this will uniformly happen without seed or further culture; and further, to prove how rapidly they will be produced, let us only observe how quickly they will show themselves in our

gardens, where the ground is rich, free, clean, and favourable for their production, and what annoyance they give us among our onions, turnips, and other esculent roots, and fruits, not to speak of our gravel walks, which must be hoed and weeded every two or three weeks. A great deal of nonsense has been talked and written on the subject of the natural grasses, and laying down land to permanent pasture, but we have seen so many disappointments occurring from the use of what has been sold as the seeds of the natural grasses, that we are of opinion that all that is necessary to ensure good permanent pasture, is first to have the land dry, clean, deep, and rich, sow the cultivated grasses in the first instance, Italian or perennial rye-grass, with clovers of various kinds; as these die off and disappear, the grasses natural to the soil will arise in their stead, and in this case there will be no loss or mistake. This course may not suit a gentleman's lawn or pleasure ground, but for general farm culture we believe the course we have pursued the best. It is only in lawns and pleasure grounds that permanent pasture ought to prevail; as a general system it is altogether unsuitable to this country, where the people are numerous and the land limited. It is quite true that men with capital and little skill may thrive by pasturing, feeding cattle and sheep, paying a moderate rent and making considerable profits; but where such a system prevails there will necessarily be much distress and poverty; the masses are deprived of employment and food, and we have not the safety valve as in England, trade and manufactures. Cultivation, therefore, and the artificial crops ought to be encouraged on all accounts.

The artificial grasses, though not so numerous, are by far the most important class of forage plants, and this is fairly admitted wherever superior cultivation prevails. The principal of these are the Italian and perennial rye-grass, with the clovers, English and American; the former of which is decidedly the best on general soils. The annual rye-grass is now neglected by our best farmers, and ought to be so; it is not worth cultivation. Sowed with clover it will produce one heavy crop, and if the

clover succeed in furnishing a second or third cutting for soiling, there will be no disappointment for one year; but it will not rise a second time, nor produce a second year. The true perennial is superior in all respects, agrees well with the grain crops and with clover, and on favourable rich ground will produce the second or even a third year, though it will always become thinner, and eventually die off and be succeeded by the natural grasses. In the general course of cultivation and usual rotations, it lasts sufficiently long as a grass crop. It is sowed with clover along with the spring corn or among wheat in the months of April and May. About three-fourths of a bushel would be sufficient for a statute acre, with 10 lbs. of clover seed: it so tillers and spreads that this small quantity is sufficient. It is good for either soiling or hay, is much relished by horses and cattle, and produces heavy crops, but in all respects it is very inferior to the Italian. There are apparently several kinds of perennial, under different names, but the farmer ought to be cautious and obtain his seed from some respectable source, or from some neighbour who has tried and proved it.

The Italian is a comparatively new grass, having been but lately cultivated in this country, but in point of utility and excellence is by far the most important plant that has been introduced during the last century, both as regards quantity and quality for feeding. It has been objected to on the grounds of delicacy and also for the coarse appearance of its hay; but though it appears delicate in the first instance, and will always, like other crops, be so on poor, thin, undrained land, if carefully managed on good land it is neither delicate nor uncertain. Being the native of a southern clime, the seed if newly imported will be a little delicate and uncertain until it has been a few years in the country and acclimated, and until we get the land in a suitable condition for it. A great deal of the imported seed is badly cleaned and kept, and much of it will not vegetate, which has caused disappointments and raised a prejudice against the grass. We are not, therefore, to pay attention to seedsmen who puff their imported seed. The

y best and the surest that can be obtained is that carefully saved and well cleaned at home, and which has lain in the country for some years. The grass and hay will appear coarse, simply because it is gigantic in proportion to all others, but either in the green state for silage, or as hay, every animal will relish and prefer it to all others, and from long experience we find it more wholesome and nutritious than any other grass. With proper management the land will produce at least double the quantity of any other; we have cut on an average eight feet from the ground, in the season, ten feet, and on the field last season, thirteen and a-half feet at three cuttings. It has also been objected to as growing thin in tufts. Its disposition is certainly to rise off the ground and not to spread and tiller; but to meet that, we must sow plenty of seed, when it will be thick enough. There are some exceedingly silly and incorrect directions given in agricultural works and periodicals on the treatment of this and other grasses, and in regard to the quantity of seed. Some say from 10 to 14 lbs. of the Italian with some half dozen other kinds recommended to be sowed to the acre, but in such cases it will certainly grow in tufts and refuse to amalgamate with any other kind except the natural grasses, which spring up as it lies away. If sowed in sufficient quantity its rapid growth and great length enable it to overreach and smother all the other grasses; but it is quite favourable to the growth of clover, which rises with it freely. No other kind can compete with it in cleaning land that is subject to annual weeds, and no other seed except the clover ought to be sowed with it. There was a sound seed both in England and this country last year about a new kind of the Italian said to be discovered, of a darker green colour, the seed awnless, and whose habit was to spread and tiller like the perennial. A field of it was said to be in the neighbourhood of Dublin, of which field we hear nothing this season. Last year we obtained a small quantity of this new seed through the hands of a Belfast gentleman; we sowed it carefully, and found it to be a very indifferent perennial, and not the true Italian rye-grass at all. The chief characteris-

tics of the true Italian are: seed awned, colour light green, habit of growth upright, and the more frequently it is cut the quicker it will grow. We will fairly challenge the United Kingdom for an equal sample of grass sowed with different crops, under various circumstances and at different seasons, and at present to be seen on the Model Farm.

We have found it peculiarly hardy, standing the frosts and seasons during the last eight years better than any other grass; if it be slightly injured by continued frosts for a time, its extreme powers of renovation and quick growth enable it in a few days of mild weather to recover itself, and in ordinary seasons it will grow on during the winter, and produce a crop in the spring before any other plant. We have sowed it in every month of the year except November, December, and January, and were in no instance disappointed in a crop. We sowed it in February and March with spring corn and vetches; in April and May upon autumn and spring wheat; in June, July, and August after stolen crops of rape, vetches, and cabbages, and on ground where early potatoes had been grown; in September on potato ground and rich oat stubble; and the first week in October with winter vetches,—and successfully in every case. If sowed with spring corn, wheat, or vetches, it will rise rapidly, seed, and in the reaping the seed will be shed and produce a thick second crop; when the vetches are cut off, which must be before they lie or injure the grass, an excellent crop of the Italian may be expected afterwards, with a strong aftermath. We have repeatedly cut a crop off the wheat and oat stubble after the grain had been removed; and if it be sowed in April, May, or June by itself, two good cuttings may be expected. During the last three years, since we have become acquainted with its habits and properties, we have not wanted cut grass for soiling more than two months in the year; we cut one portion until near Christmas, and commenced the other in March. During the last mild season we commenced cutting the spring crop for all our stock on the 27th of February. The quantity of land under grass annually on our farm is about fourteen British acres;

our regular stock of cattle is twenty-two head, with three horses and thirty pigs, and these fourteen acres keep them in abundance of grass for soiling and hay during the year: this is the best recommendation we can give it.

In the maintenance and feeding of sheep and lambs this grass will be invaluable, and far superior to either vetches or rape. In a five or six course rotation they may be pastured on the field which is to be broken up for oats, and which will produce a luxuriant aftermath until after Christmas, when the succeeding fields which have been laid down in spring with grain crops or in summer after vetches, potatoes, &c., will have abundance of grass at that time, and will continue to feed during the spring and summer months. More than double the usual quantity of sheep may be kept on the same land, and in higher condition by this grass than any other crop, and if partially house-fed on turnips and hay, so much the better.

There is a peculiarity in the cultivation of this grass which must be strictly attended to—if the seed is sowed even in abundance, and *covered deep in the ground, it will not grow*; the lighter it is covered the better. If the ground is loose and free, simply rolling, after sowing, will be quite sufficient. This we do on our spring wheat, and oat crops, and find it to succeed best. A bush, or very light harrow, must be used, if such be necessary, and the ground rolled afterwards. We have known many instances of failures of this crop, in consequence of using the heavy harrow, and covering deep. All the grasses, and even the trefoils, are injured from the same cause.

We have before stated, that the habit of the Italian is to rise up, not to spread and tiller; therefore, the seed must be sowed in abundance. We never sow less than three bushels to the statute acre sometimes, and at late seasons more; and if the seed has been properly saved and cleaned, a bushel will weigh from 16 to 20 lbs. We always clean our seed in the winnowing machine, and if we sow clover, from 10 to 12 lbs of the English to the acre; if permanent pasture is to succeed the Italian, 12 or 14 lbs. of white trefoil ought to be sowed at the same time.

The clovers are another most important part of the cultivated forage crops, and are properly classed with the grasses; they ought always to compose a part of such crops, for soiling and hay, as they materially add both to the quantity and quality of such food. The clovers are sometimes cultivated by themselves, and produce great returns, but they are much better, in every respect, mixed with Italian, or perennial ryegrass. These are always good cleaning crops, and wheat or oats succeeds them well. The continued cultivation of clover on the same land, has, like a succession of other crops, tired and exhausted the soil of the inorganic constituents, and failures are the consequence; in such cases the land is said to be "clover sick." This to the farmer, is a serious inconvenience, for on a second or third crop of clover among his grasses, during the summer and autumn, he ought in a great measure to depend. The best and obvious remedy for this disease, and to renovate the ground, is trenching, deepening, and mixing the soil, manuring with gypsum, and other inorganic constituents of clover, following a judicious rotation, and keeping the same crops at a proper distance asunder.

The red clovers for cultivation, are the most important. The trefoils are sowed down for permanent pasture. Of the former there are two kinds, but on the generality of soils, the English is to be preferred. Red clover seeds are imported from France, and other continental countries, in great abundance, which thrive well here, and produce large crops. The freshest and apparently best seeds that appeared in the Dublin markets last year, were the French.

The clover is sowed with, and managed like, the ryegrass, and the same precautions are necessary to insure its growth and a crop,—the ground ought to be loose, and fine, the seed merely covered, but not deeply, and it ought in no case to lie exposed to the sun for any length of time after sowing. The seed, being small, will fall in among the particles of earth, and a slight bush harrow, or even roller, will, on loose, free land, be sufficient to cover it. From 10 to 12 lbs. of seed will be sufficient to a statute acre, and if the land is intended

to remain in permanent pasture, 10 or 12 lbs. of trefoil or white clover will be necessary.

There are a variety of other forage plants found growing naturally, or cultivated in various parts of the world, the principal of which are lucerne and sainfoin, and the former of these has been strongly recommended as profitable and nutritious. We have seen it in different parts of this country, also on the continent, but it never came up to the character which it has obtained from its advocates, either for quantity or quality. Persons who were pleased with such yield and produce, could have known little of a thorough crop of Italian rye-grass and clover. The soil suitable for this crop is a dry warm limestone, and it is best cultivated in drills, from fifteen to eighteen inches asunder. If kept clean, it will remain a number of years in the ground.

#### HARVESTING THE CULTIVATED GRASSES.

This requires some skill, and much attention in bad weather, but in ordinary seasons is easily accomplished. If there be much clover, or clover without rye-grass, it will be difficult to be saved, and in wet weather can scarcely be accomplished. The cultivated grasses, though heavier crops, and in greater abundance than the natural, or what is usually called meadow, are easier saved, from being stronger and coarser, with more stem than leaves. In this country, hay in general is badly saved, and of inferior quality, arising from two principal causes,—first, the grass is suffered to stand too long, to ripen and wither, before it is cut; and secondly, the awkward turning, tossing, and frequent spreading out to the weather, sun, and dews which it undergoes, tend still more to wither and discolour it. The farmer ought to know, that grass when green and coming into flower, contains a great portion of its matter in a very nutritive and sweet state, it contains a great deal of sugar; but in a short time, by a simple chemical process, the sugar becomes starch, and the grass is less sweet and nutritious; and if allowed to stand until it matures its seed, and wither, the starch will have become *woody fibre*.



and be more difficult to chew and digest, but far less nourishing. In this latter state we find perhaps nine-tenths of the hay in the Dublin market. The reasons a farmer will give for allowing his grass to stand so long is, in order to have a large produce, a full crop; but this is a great mistake, the sooner one crop is cut, the better and earlier the second will be. Two crops cut green, will be immensely better in every respect than one cut too ripe. The English excel us very much in the management of their grass and hay crops. If the seed has to be saved from the Italian or perennial grass, it must stand until the seed is formed and perfect, and this is a very nice point to determine; but even the hay of these is injured in consequence. They ought to be cut green if a superior quality is required. The best mode of managing the Italian, is to cut the first crop early, for soiling or hay, and save the seed from the second, which will be pure, as no other grass will come forward and seed so soon the second time.

The mode we have always followed, and which we pursue on the Model Farm, is equally simple and efficacious in all kinds of weather and seasons, and we never had bad or spoiled hay. We cut the grass just as we can save it and according to the weather. The first day cut and let the grass lie in the sward. The second morning, when the damp and dew has been evaporated, we shake it all out carefully over the ground, and *with the hands*; in the middle of the day turn it over carefully, and in the afternoon rake it up and roll it into *lap cocks*. If it has been dry, it will then be perfectly safe and may lie so for any convenient time, as no weather will injure these lap cocks, and there is a comparatively small surface of the hay exposed. Any convenient time, say from four to eight days, we put it into tramp cocks, and these are always built in the stack-yard, and turned into the common rick when convenient or necessary.\* It is exceedingly inconvenient and unprofitable to have cocks built in the field or meadow,

\* In favourable weather the lap cocks may be drawn in and built in the permanent rick at once instead of tramp cocks.

standing until after harvest or late autumn, spoiling with wet both on the top and at the bottom.

We hope to see the day, when there will be no such thing on any Irish farm, as what is called meadow—a considerable portion of the farm lying during the season under aquatic and other inferior grasses. It is melancholy to see so much of the fine land so prostituted, which, if broken up, cultivated, and the proper crops sowed, would produce four times as much, besides the large amount of profitable employment it would afford. This, with the old pasture system, will some day yield to common sense and even self-interest.

---

## CHAPTER XXIV.

### THE GRAIN CROPS.

THIS is the third class of crops that make up the general and necessary produce of the farm, and though they are of the greatest importance on all accounts, yet their merits have been much overrated by the farming community in general, and successful and improved cultivation has been retarded in consequence.

A certain portion of the land must always be under these crops—bread, the staff of life, must be produced; besides, our cattle and horses receive a great part of their subsistence from them; and though we strongly deprecate a succession of grain crops, and the principal part of the farm occupied by them, yet we are quite sensible of their value and importance.

When we recommend green cropping and house-feeding, it by no means follows that we dispense with any of the grain; on the contrary, we can have a greater space for it, and the quantity will be immensely increased on the same ground; by the addition of manure and careful culture, more grain and more money, more straw and more manure are the consequences of a better system.

It will be quite unnecessary to dwell upon the nature and properties of grain, as, of all other subjects, this is the one with which our farmers are most familiar and best acquainted, their chief attention being directed to the subject; besides, the matter itself is both simple and easily understood. At the same time a few hints on this subject may not be out of place.

The land to produce grain crops as it ought to do in quantity and quality, must be in the same state as for other kinds, viz., dry, deep, clean, and rich; though they are not so delicate to manage, nor so nice in the choice of soil, still if properly and correctly treated they will pay for all the care and attention bestowed upon them. With common justice they are constant and certain, and will contribute a considerable portion to the farmer's income.

It has been a common maxim among farmers, that grain of various kinds had attachments for certain soils, upon which each particular sort succeeded and throve best, and therefore it was necessary to cultivate and raise the particular kind of grain upon a farm of the particular soil that suited it, to the exclusion of all others; for instance, wheat upon all the stiff clay soils, barley and oats upon the light and gravelly lands, and rye upon peat and sands, but as in other cases; superior knowledge and culture have in a great measure broken through these old rules, and the grain crops of various kinds are produced on soils and in situations, where it was thought they would not thrive, and simply because the land has been changed in its disposition by good management. A clay soil in good condition will always be favourable for wheat, but it will likewise produce excellent barley and oats; and a sharp gravelly soil, which is favourable for barley or oats, will in like circumstances produce excellent wheat. By feeding off turnips with sheep, on the light inferior soils in Norfolk and other parts of England, wheat of a superior quality is now produced, where some years ago it was never thought of. The oat is a grain common to, and may be grown on any soil that will produce a crop, but the other cereals are not so hardy or certain; this is a strong

recommendation for the oat, and on an average of years and soils there is not one of the grain crops will pay better, particularly as both grain and straw may be turned to so many accounts. Wheat is the general favourite in this country as well as in most others, but it may be questioned whether, on an average of years, it will be more valuable than the oat. Ours is not a wheat climate, it is too damp and humid, our grain is always of inferior quality, coarse and soft; it is only in the hot dry countries and in dry summers that the choice sample can be produced. Barley is an important grain, valuable when successfully cultivated, and furnishes nutritive aliment for man and beast. The Scotch excel in the cultivation and management of barley, though their soil in general is by no means favourable for the growth of this crop. Rye is not a general crop in the United Kingdom, it is raised on particular soils and situations, on light sandy land or on peat soil; it produces largely when well managed, and is both nutritious and profitable.

The cultivation of the grain crops is simple and easily understood, but in general very imperfectly executed. The plough and harrow are the chief implements used, and sometimes the drill; drilling is to be preferred where practicable, but it is only in certain cases that it can be accomplished. On the small farm where the spade only is used, all kinds of grain may be sowed in drill after the ground has been digged and loose, the drills may be opened by a turnip hoe and garden line at the required width and depth, say fifteen inches by two or three deep; the seed sowed and covered with a rake, and the grass seeds sowed at the same time, if required. The advantages of drilling grain crops are,—first, a saving of seed, say one-third or one-half; secondly, all weeds may be hoed and eradicated during the after growth; and thirdly, there is a passage for air, a means of ventilation during the growth of the crop. There is much difference of opinion as to the merits of broadcast and drill, but there can be no doubt that more grain will be produced from the same quantity of seed in drill than if sowed broadcast. The greater quantity

however, on large farms will always be sowed broadcast, and if the land be in good condition, well ploughed, the seed carefully and regularly sowed, well harrowed, and rolled if necessary, a good crop will always be had. Much depends upon the manner in which the ground is ploughed and prepared for the seed, and the season and weather in which it is done. Ploughing is now pretty well understood in most localities; ploughing matches and farming societies have done a great deal to improve the knowledge and practice of this very essential operation. This is not the time nor place to discuss the subject of the science of ploughs and ploughing, all information may be obtained from Stephen's Book of the Farm, Lowe's Agriculture, and a variety of other works on the subject; but we may here remark, that ploughing for a grain crop ought to be deep, five or six inches at least, the furrows straight, all the ground to the depth turned up, no baulks left below; compactly and regularly laid together, no heights or hollows, and the ridges well formed, so that the harrow may catch and act on all the furrows alike. When complete drainage has been carried out, no furrows to carry off the water will be necessary; the turn wrest plough will be used, the land turned over level, which will be a great advantage and saving of seed and labour; narrow ridges with wide furrows are a sad loss and annoyance. When the ploughing has been neatly and well performed, and in proper season, the grain may be sowed broadcast before the hollow, and fully as much of the success of a crop depends on the harrowing as on the ploughing. We are far astray in this respect; in general we do not break down and pulverize the land as we ought, nor do we sink and cover the seed sufficiently; our harrows are far too light and the pins short—a good garden rake would do as much execution as the majority of them; the consequence is, that where such are used to cover the seed, the furrows must be sunk with plough or spade and shovelled on the ridge, a process that unnecessarily consumes time and money. The iron harrow will be found the best, and some of an excellent construction are to be had in the North, in the county Down, also

in Dublin; we have one of this kind made in Crawfordsburn, parish of Bangor, which does the work remarkably well, drawn by three horses. When ground is properly harrowed, the furrows are imperceptible, broken down through, the seed sunk and covered sufficiently, requiring no shovelling or after process, and the roots of the young plants may freely penetrate in search of food. The roller will always be necessary in dry weather, but on heavy land it must be used very cautiously; if there be damp or moisture in the ground, it will do more harm than good. A harrow with revolving pins has lately been introduced from Norway, and improved in England, of which report speaks highly; we have not seen it tried. Crosskills' clod-crusher is also an implement of great merit, on various soils, and for various purposes. Such implements are beyond the means of the majority of Irish farmers; but an efficient harrow can in no case be dispensed with on a horse farm.

#### WHEAT.

Of this grain there are many varieties, and it would be impossible to point out any particular kind better suited than another to the different soils and localities of the country; every farmer, after practical experience, ought to be the best judge of what suits himself. This grain must always be cultivated on rich ground after green fallow crop, potatoes or turnips, beans, or on a clover lea.\* There are two distinct kinds, red and white, and these for different seasons, the autumn sown and spring wheat; the latter kind usually follows turnips. The autumn sown wheat is generally the best both in quantity and quality, and at this time the general crop ought to be deposited if at all convenient. On dry land the sowing may be prolonged even through the month of November, and we have seen excellent crops that have been sowed near Christmas. The sowing of

\* It has been observed that manure from cities and towns will almost always produce the best crops of wheat, and this is quite agreeable to theory; town manure is particularly rich in ammonia and the phosphates.

spring wheat may commence at the first of February, and continue till near the end of March. This crop is generally sowed broadcast, whether in autumn or spring. The heavy soils are ridged up with a strong furrow, the seed sowed, the ground harrowed, water-furrowed; in dry well drained land this latter operation is not required, on such soils the seed is sometimes sowed and ploughed down, and if it could be drilled, so much the better; any weeds that might appear in the spring could be eradicated by the hoe, and grass seeds and clover sowed if necessary.

There is no subject that has occasioned more difference of opinion among farmers than that of thick and thin sowing of the grain crops, and still the controversy is undecided. We are much inclined to join the latter party, being convinced from practical experience that they are on the safe side, particularly if the land is dry and rich; *this makes all the difference*. On poor, thin, wet land a considerable quantity of seed must be put. In order to have the semblance of a crop, it requires a multitude of short, light, delicate straws to cover the ground; but on the same, space of a field, dry, clean, and rich the same number of plants would be superfluous, hurtful to each other, would shoot up tall and slender, and would lodge and spoil before harvest; on such a field the one-half or one-third of the grain would be sufficient to produce a superior crop. We are not prepared to deny that a crop of wheat sowed thick, will produce a sample of grain superior to the same sowed thin, but there are serious drawbacks to this slight advantage, and the large quantity of seed required for such crops is of considerable consequence. We are decidedly of opinion that generally through Ireland, there is one-third to one-half more seed sowed of the grain crops than ought to be on the same quantity of land; there is moderation to be observed in all things, but when we hear of a barrel and a half (thirty stones) of wheat sowed upon an Irish acre, we cannot call this moderation. If the land is in proper condition, eight stones of wheat will be sufficient for a statute acre; and if drilled, from five to six stones. It may be dibbled, and half that quantity

will be sufficient, always bearing in mind that the land must be in high condition to bear a full crop from this quantity.

Wheat that is sowed in autumn, early winter, or even spring, must be carefully watched and managed. It is not sufficient to sow and cover the seed, rid up the furrows, and leave it to nature during the remainder of the season; the ground will consolidate, the surface will become hard in the spring months, and the crop will suffer, become sickly and delicate. In all such cases we must loosen the soil by the harrow and roller whether we sow grass seed or no; Crosskills' clod-crusher is said to be excellent for this purpose. On the small farm, where the crop has been drilled, in the spring boys or women can do this with hand hoes in a very efficient and superior manner, loosening the earth, eradicating weeds, and if grasses and clover be sowed before them, they will cover it, and the trampling of the feet will roll it down sufficiently. It will be astonishing to see the change produced on a sickly crop, and in a short time after this operation.

Wheat of all other grain is liable to a variety of diseases during its growth, the principal of which is smut or blacks, which spoil and deteriorate the sample of grain as well as straw; oats are also liable to smut, but are not injured so much as the wheat—the smut balls burst early and are shaken off before or during harvest. A great variety of prescriptions have been recommended and used to saturate and steep the seed before sowing, and many of them with the desired effect. The most efficacious have been solutions of blue vitriol, arsenic, common salt, urine, &c., &c.; the grain steeped during a short time in any of these, afterwards dried with powdered lime and sowed immediately. Some of these however are dangerous, particularly arsenic and urine. Blue vitriol is said to be a specific in England; but perhaps a strong pickle of salt and water (what will carry an egg), the seed steeped from two to three hours, then dried with powdered lime, is as efficacious as any of them. We have been in the habit of adopting a peculiar plan of preparing the seed during the last



twenty years ; we have recommended it and seen it tried by others, and when properly carried out have never known an instance of a failure ; it will even cure smutty wheat and render it fit for seed, and it is simple and easily accomplished. Take a bushel of wheat, put it into a tub, mix well with it two shovels full of *powdered quick lime*, on this mixture pour a *gallon of boiling water* (the water must be perfectly boiling), mix well until all be wet and in a state of mortar, then turn it out on an earthen or stone floor, leave it clapped up in a heap from twelve to fourteen hours, it will then have become firm, break it down carefully and spread it on the floor, it will keep for weeks without injury, and when sowed will be found to vegetate much quicker than by any other process. Any required quantity, of course, will be treated in like manner as the bushel.

#### THE OAT.

The oat is the most common grain crop, and if we are not far mistaken, of more importance in this country than wheat, it is so hardy, certain, and its uses so general. It will grow on any soil or in any situation, even on land of inferior quality and poor ; on good rich land it will succeed in all seasons, and for good, strong, substantial food for man and beast nothing can excel it. This is the bread food of the great bulk of the people in the north of Ireland and Scotland, and this is the strongest proof of its excellence ; no people on the face of the earth are more health, hardy, strong, able, and willing to do their work and their duty, than these same people, feeding upon the oatcake, porridge in various forms, flummery, broze, haggis, &c., &c. ; and then for the inferior animals, horses, cattle, sheep, and pigs, what can be compared to the oat in different forms for keeping them up in high condition or fattening off for the market. This will give a strength and stamina to the young animal beyond any other kind of food. All things considered, then, we may fairly conclude that this is the very best and most remunerative grain crop that we can cultivate.

Like the wheat, there are numerous varieties of the oat which are all comprehended in the simple divisions of long and short, white and black; these have been derived from almost every country in the world, and are sometimes so named, as the Siberian, Tartarian, Poland, Holland, &c., and sometimes from local or particular names, as the Polato, Hopetoun, Sandy, Blanter, Angus Oat, &c. The short oat suits rich land best, and the long oat the poorer soils; but the farmer from experience will be the best judge of the kinds that suit his soil and climate.

This crop is not usually sowed in autumn or winter; some attempts have been made to do so, but in general unsuccessful. The spring or lent season is the usual and best, and if the ground be dry and in good condition, February and March ought to be the time, but sometimes it is sowed later, even in April—the earlier, however, the better, if the land be in order; but this or any other spring crop ought not to be sowed when the ground is wet, a *dry bed* for the spring crops ought to be a ruling principle, and if the ground has been early ploughed or digged, it will be early fit for the seed, and easily broken down, which it ought always to be, and the seed well covered. This grain in general follows a grass crop on lea, or a green fallow crop; it ought never to follow another oat or grain crop; the ground should be well harrowed and broken, it may be drilled, and most successfully on the small or other farm where practicable, and grass seeds and clover will thrive with it well.

The usual quantity of seed sowed in this country is far too much, particularly if the land was in a natural condition, from six to eight stones to the statute acre ought to be quite enough; we do not in any case sow more than five stones on the Model Farm, and we have very heavy crops. All the after management that is required, is rolling, if the weather be dry, and weeding in the early summer.

#### BARLEY.

Barley is another important grain crop on many accounts, and will always be in demand so long as malt

and strong liquors are consumed by the human race; it also forms excellent food for man and beast, and comes very opportunely into our rotations after a green fallow crop, particularly after turnips, which are very favourable for it, much more so than the oat. The barley is by no means so sure a crop as the oat, and it requires much more skill in the cultivation. There are many varieties, the principal of which is the two rowed and the six rowed. The favourite kinds at present in cultivation in this country are what we call the Chevalier, and the common two rowed Scotch. Like the wheat there are two kinds for the different seasons—winter and spring. Winter barley is usually called Bere, but it is not much cultivated in this country, the great bulk is sowed in spring, after the turnips or other green fallow crops. The ground is ridged up, and the seed sowed broadcast, while the ground is fresh; this is a peculiarity attending the barley crop. If the ground be long ploughed before the seed is sown, we are not so sure of a hit crop, as upon what we call the hot furrow—that is, the ground fresh. The land must be dry and clean for barley, and when it is so, grass seeds and clover will succeed well sowed along with it. It grows quickly and ripens early, and in this case it is sometimes sowed late after winter vetches, rape, &c. even in May, but this course is not to be recommended; the surest and best crop on an average will be sowed in March along with other lent crops.

The young plants of this grain incline much to spread and tiller on the ground, and particularly so when sown thin, which it ought always to be; from four to six stones to the statute acre will be quite sufficient. One of the objections to the barley crop is, the indifferent quality of its straw, in this respect the oat is decidedly superior, and even the wheat for fodder in winter; nevertheless barley, when it succeeds, is a valuable and paying crop.

#### RYE.

Rye is not much cultivated in this country, but on the continent of Europe it is so, extensively, supplying a

a great portion of the food of the lower orders; it is also grown in Asia and America. It is suitable for light, peaty, or sandy soils, and is cultivated like the autumn or winter wheat, and about the same weight per acre of seed is sufficient. It is very commonly sowed with winter vetches, it grows up and supports them, and adds very much to the bulk of crop in spring; it is sometimes sowed by itself for green spring food, but we would by no means recommend it for such.

#### HARVESTING.

Harvesting and saving the various grain crops is now pretty generally understood, but sometimes very badly practised, and in no respect so much as allowing them to stand too long and over-ripen before they are cut; this mistake leads to serious losses in various ways. In the first place, the quality of the grain is deteriorated, the husk becomes thick and discoloured, and the sample inferior; secondly, a great loss is caused in the cutting and handling the grain before it reaches the barn, by the over-ripe straw shedding. On these accounts, therefore, we ought to cut our grain rather green than otherwise, for it will fully mature and ripen in the stook; it is a grievous mistake to allow grain to stand until the straw has become a dark yellow or brown colour, for by that time the grain is injured. We ought not to look so much at the colour of a field as to ascertain if the grain is not soft, but has become hard and firm, and in that case let it be cut at once. The general mode of reaping grain through the greater part of Ireland is certainly very awkward, what is called ledging, cutting the grain and leaving it lying on the ridge, spread abroad during a number of days, and then women, boys, and men going through binding it up in very small sheaves, and setting these up in shocks; these again after some time built into small huts, or stacks, and left there for a time. Now all this may be done in a fine season and the grain safe when brought into the stack yard, but in an uncertain wet time it would be impossible to save it so; besides there is great additional trouble and expense attending this process,

and much loss of grain and even straw. The mode of harvesting in the north of Ireland and in Scotland is much preferable; there the grain is cut with scythe or hook, is bound into moderately sized sheaves, and immediately set up in stooks, twelve sheaves each and covered by two; these standing north and south. These if carefully built will stand; the air passing round on all sides and through them, and in ordinary seasons and weather will be fit to be carried to the stack-yard or barn in fine order in the course of eight days, without loss or trouble. There is no better mode known or practised in any country in the world than this.

---

## CHAPTER XXV.

### CULTIVATION OF FLAX.

BESIDES the foregoing three classes, the green fallow, the grasses, and the grain crops, which comprise the chief products of the farm, there is another, and a very important one in this country, which deserves some special notice—we mean the flax crop.

This plant was well known and cultivated by the ancients. Linen is spoken of in the earliest records. At what time it was introduced into this country is uncertain, but that it has been extensively cultivated and manufactured, particularly in the north, during a lengthened period, is well known. The linen trade in all its branches has been considered a lucky and thriving business, and has tended more perhaps than any other to diffuse comfort and independence wherever it has prevailed; it is chiefly, therefore, on this account that we are to estimate the value and importance of this plant.

Like all the other plants and crops, flax has been very badly cultivated and managed with us, even in localities where it is best known, the ground badly prepared for it, a succession or too frequent culture on a soil in every respect favourable for it, the want of con-

dition and proper manure has so exhausted the land that it refuses to produce remunerating crops, and the extremely erroneous and imperfect treatment it receives between the pulling and marketing, has been a most serious drawback from its capabilities and value.

The Belgians have practically demonstrated our careless and erroneous methods of cultivating and managing this crop, through all its various and intricate stages; and the penalty we pay for our stupidity and ignorance; no doubt a vast improvement has taken place in the modes of treating our flax within the last few years, and this chiefly arising from the exertions of the gentlemen of the north of Ireland, composing the Flax Improvement Society; and though their efforts have been well directed and energetically carried out, still they have much to do yet before we are along side our Belgian neighbours either in the rearing or management of the crop.

In a national point of view, we consider this one of the most profitable and important crops that can be raised from the land, but as it is usually managed, so far as individual farms are concerned, it is by no means such, particularly when the farmer has to pay seed, labour, cleaning, and preparing for the market; when such charges are deducted, though the crop may have been a good one, and the produce sold at a high figure, the netted sum will not in general be extraordinary. There is a great delusion abroad regarding the large acreable sums said to have been realised by the sale of flax, and some very absurd and exaggerated statements have appeared from time to time on the subject. It is quite true that a hit crop of flax, well managed and handled, and brought to a favourable market, will return a large acreable sum, much more certainly than a grain crop; but, as we have before hinted, if the farmer has paid seed, labour, and all other charges—if he keep correct accounts, and subtract the expenditure from the income, there will be a serious reduction indeed, and the net realised sum will be a comparatively moderate one on average years, not certainly greater, or equal to, any of the cultivated fallow crops, or even a crop of good clover and grass, where house-feeding and good dairy manage-

ment are carried out. The persons who estimate and laud the flax crop so highly, are in general those who are unacquainted with the value and importance of the green crops, house-feeding, and the produce of cattle. It will be recollected that we are speaking of the case, in an individual point of view, of the returns and value of the crop; to the farmer who has to employ strangers and pay all expenses attending it, it certainly does great public good in a country such as ours, where employment at all seasons is so acceptable, but it is only in rare instances that we find extensive farmers so patriotic as to cultivate such a crop for such a purpose, and it is perhaps from this cause that it has not been a favourite on the extensive farms in England and Scotland, where human labour is expensive, nor is it at all likely to become so, except for feeding stock. In estimating the true value of a crop, we must ascertain its effects upon the soil from which it has been produced, whether it exhausts or otherwise; considerable difference of opinion has arisen on the subject of the flax in this particular, and the practical farmer and the chemist have taken different views of the question. The farmer from experience has no hesitation in pronouncing it a severe, even a scourging crop, and can adduce instances of the total failure of a succeeding crop of the same kind, on the same ground, a second year; the impossibility of cultivating it successfully at short intervals of years on the same land, and the uncertainty of it on the best lands where it has been frequently grown; he will adduce an old saying, "that it takes much and leaves little in return." The man of science will show by analysis and prove that the flax, particularly the fibre, is nearly independent of the soil for its food and constituent parts, that the great bulk is supplied by the air in the form of carbonic acid and water, and that the inorganic matter itself may be retained on the farm by judicious management, consequently it cannot be what it is represented, a scourging crop. We believe that they are both right, and that the mode of treatment and management makes all the difference. There is no question that by the usual way of treating the flax it must be an exhausting crop indeed,

particularly of the phosphates. Professor Johnston, in his valuable report to the Agricultural Chemical Society of Scotland on the nature and analysis of flax seed, shows, that it is very rich in the phosphates, and of course will exhaust the soil of such. When the flax is merely pulled, carried to the pond to steep, the seed allowed to shed there and putrefy in the bottom, the shaw or stem carried to the mill, and the fibre to the market, it could not be otherwise than an exhauster of the soil; but by a different course of management, when the seed is carefully preserved and appropriated to the feeding of stock on the farm, the stem returned to the dungheap in some form, even the putrid water in which it had been steeped rendered available for enriching the soil, instead of remaining offensive in stagnant pools or polluting the rivers; very little exhaustion of the soil can occur from the small quantity of fibre taken to market. It is now well ascertained and generally known that the seed, even after the oil has been expressed, is a most valuable food for all kinds of stock, young and old; it not only supplies bone, fat, and muscle, but at the same time acts medicinally, bringing and keeping all the animals of the farm in high health and condition; in this respect it is invaluable, and is at present attracting the attention of the farming interest in every country in the world, and must continue to advance in public estimation. We must, however, extend our sphere of observation, and see how far, in a national point of view, the flax crop is capable of conferring immense benefits on a great community; that it has done so in different ages and countries is matter of history, but we shall confine ourselves to our own. We remember some forty years ago the North of Ireland was, as at present, studded over with small farms; the people of all ranks, even the day labourers, were comfortable and thriving, and this arose chiefly from the linen trade. Different ranks and classes were engaged in it more or less, from the extensive manufacturer of diaper and linen, to the humble weaver in his cottage, turning the produce of his small farm, spun by his wife and family, into the incomparable eighteen hundred web for the Linenhall.

.



Then every person was employed, and every person was paid, male and female, for that was the peculiar excellence and advantage of the linen trade, that the female portion of a family were independent, being always able to support and do for themselves; even the widowed mother and orphan had a virtuous resource in the spinning wheel. About that time every female could by common application earn from 8*d.* to 1*s.* a day; the *crack* spinners, who could turn a pound of flax into twenty or thirty hanks of yarn, were not satisfied with double that sum. The females of the labourer's family earned their chief support and were the main stay of the household. Such families as held no land, were able to obtain the whole or a great part of the raw material, the flax, by a fair exchange with a neighbouring farmer, a certain portion of labour in the spring, haymaking, or harvest, for a certain space of flax ground; the seed and after management of the flax were supplied by the poor family. This arrangement was mutually beneficial to the parties, no outlay of money on either side, and the produce of the crop in general afforded employment for the females during the year, a healthy and invigorating employment; the spinning wheel, without being fatiguing, keeps every muscle, joint, and portion of the frame in motion, promoting activity and a sound constitution. What a contrast do we behold between the pale wan features, decrepid frame, and sunken eye of the poor hand sewer, milliner, or dressmaker, doomed to a sedentary life, to sit crouching with chest compressed during the day, and perhaps a portion of the night, without sufficient action and exercise; and the glowing cheek, sparkling eye, cheerful countenance, erect well proportioned frame, and active limbs of the pretty girl at her spinning wheel. The linen trade, therefore, promoted not only comfort and independence, but health and happiness at the same time.

If we extend a degree beyond the labourer to the small farmer holding a few acres of land, we find the flax crop equally efficient in promoting the prosperity of this numerous and important class; he always appropriated a certain portion of his land to that crop, according as it was favourable or otherwise for the growth of flax;

but in general every such person raised as much at least as would supply the wants and employment of the family during the year. All the necessary culture and after management were performed by the household, even the scutching in many instances, and without any outlay of money; the female part of the family were all employed during the year in spinning the produce into yarn, a portion of which was carried to market and sold, and the remainder converted into cloth of various textures and qualities for the use of the household for clothing, bedding, sacking, &c. It generally happened that the father or some member of the family had been taught the simple trade of linen weaver, and during the winter nights, in bad weather, or when out-door work was slack, they plied the loom, turning the produce of the wheels into the most substantial and beneficial cloths for all the various purposes mentioned; and besides, managed to have one or more webs of a fine and superior description for sale at the Linenhall, which paid the rent of the small farm, and the family had all the remainder produce free for their maintainance; thus comfort and independence were obtained and enjoyed. There was still another and a numerous class of persons, who confined themselves entirely to their trade, to the loom, who purchased the yarn and sold the cloth in the market, or who wove the yarn into cloth of different kinds for the extensive farmers in their neighbourhood, and were paid by the piece or the yard for their work; these people, when industrious, were always employed, and lived comfortably. But it was not to the labourers, the weavers, and the small farmers that the linen manufacture was confined; the most respectable and extensive farmers in the north joined and participated in the benefits. No farmer's wife or daughter refused or neglected to employ herself in spinning, knitting, or sewing; such were enjoyed as a relaxation from more active and severe duties. In every farm house the spinning-wheels were in requisition, and every good house-wife had all the linen cloth for various purposes manufactured under her own superintendance and inspection. It was then the chests, drawers, and lockers were crammed with all the neces-

ary table linen and wearing apparel of the most beautiful and substantial description. The people at that time commenced to dress from the skin out; it was not then the tawdry silks and muslins to hide the frippery and rags underneath. There was a noble ambition and emulation among the families in their several neighbourhoods, as to which could exhibit the greatest quantity and variety, and the best quality of their home-made linen; and this in a great measure was the test of the good house-wife. No prudent woman in those days would have trusted her husband or son abroad with a calico shirt, or herself and daughters with muslin petticoats or aprons; if she had, "her ears might have itched,"—she would have incurred the gossip of the parish, and the odium of a bad manager. Besides the happy combination of manufacturing with agricultural industry, which rendered the north of Ireland so prosperous, the linen trade employed a great number of mechanics, which were scattered over the face of the country, and who were in comfortable circumstances, obtaining good wages and constant employment; these were carpenters, wheel wrights, spindle makers, reed makers, &c., besides those employed in bleaching and preparing cloth for market. There was a very respectable class of men, *yarn merchants*, who bought and sold in the different markets, purchased from the spinners of yarn, and sold to the manufacturers of cloth; these men, from habit and intercourse with a particular class, the modest, simple, virtuous females of the rural districts, were almost, without exception, themselves honest, straight-forward, and good tempered. This was considered a very fortunate and thriving business; men of considerable capital embarked in it, and generally with success. The bleachers and extensive manufacturers were also numerous, as at present, but under different circumstances.

Nearly all the useful and necessary raiment for the human body, besides many luxuries, were thus produced by the flax plant, from the finest lace and lawn to the coarsest shirting—from the unrivalled diaper to the coarse sacking and winnowing sheet; every article of bedding of the best description, with the exception of the blankets,

viz., the covering of the mattress, bed-tick, bolster, pillows with cases, sheets, quilts, and curtains. All the female attire, with the exception of the cloak, bonnet, and shoes, and all of a clean and lasting description, from the stockings to the cap. And in like manner, nearly all the necessary clothing of the men, with the exception of the hat, outside coat, and a few others; not to speak of articles for domestic purposes, such as table-cloths, towels, sacks, &c. From these considerations, and looking minutely into the case, it may be fairly presumed that no other plant is capable of supplying so many of the wants and necessities of the human race, particularly under the condition and circumstances of this country; no other crop merits more care and attention, and on this ground the exertions of the Flax Improvement Society are beyond all praise, are calculated to improve the country in an eminent degree, and are worthy of the co-operation and encouragement of every individual anxious and interested in the welfare of Ireland.

It may be a question whether any means could be devised more likely to change and improve the condition of the people of the south and west, than encouraging the growth and manufacture of flax; we mean the domestic manufacture, as it was formerly conducted in the north. The want of employment, of trade and manufactures, are the evils under which we suffer, but here are the means of an extensive native manufacture lying dormant, which by very slight exertion may be roused into activity. Little capital is required; the loom and the spinning-wheel are the chief machinery.\* The soil in any part of Ireland will produce the raw material by diffusing a degree of knowledge among the people; the modes of preparing the ground and cultivating the crop, the after management and cleaning the flax, spinning and weaving, these matters might all be easily taught and ac-

\* Since writing the above we have learned that looms of an entirely new description have been invented in Belgium, and are likely to be introduced into this country, and which are eminently calculated to advance our domestic manufacture. Mr. Richard Robinson of Lisburn, so eminently successful in introducing other important domestic implements, is the Irish Agent of the patentee, and proposes to exhibit specimens at the Royal Agricultural Society's show in Limerick.

quired, and would be a source of employment for male and female, particularly for the latter. Where at present thousands are idle, or nearly so, badly clothed and worse fed, they might be constantly and profitably employed in preparing clothes for themselves and others; and though the wages earned might not be high, still even a trifle would be better than no employment and wages at all. It is rather singular that our Royal Agricultural Society has not taken up this subject; it would certainly be a proper and tangible object, worthy of such a body. Premiums offered in the different districts for the produce of flax, yarn, and cloth home made, would certainly stimulate native industry and improve the condition of the masses. Such societies, to be really efficient, must extend their views, look into and improve the condition of the people, as well as the breeds of cattle, sheep, and swine.

But it may be said, that the prosperous state of the linen trade which we have described, and which existed in Ulster in former times, has been much changed, and that at present a very different state of things exists. We admit all this, and regret it too; the progress of machinery has produced a revolution there in the linen as well as in other countries and other trades. The progress of science and art must and will go on, though the effects may be severely felt for a time by particular classes, and often the community pays a fearful price for such discoveries. This was particularly the case in Ulster, and the introduction of machinery was severely felt there. The cotton in a great measure took the place of linen; then came the age of spinning-jennies, calico shirts, and drabble-tailed muslin gowns. The new flimsy inferior cotton became the rage, the fashion, and the good old substantial fabric was neglected or despised. The cotton business for a time, and even now, is the source of profitable employment, and a great majority of those who had been engaged in the linen turned their attention to this new business. Besides, cotton dresses were comparatively cheap, and particularly showy; this ran away with the judgment, and the use of linen for such became almost neglected, even for common domestic

use. But the fallacy and error of such proceedings may be very easily exposed. We will grant that a yard of muslin or calico may be purchased much cheaper than a yard of linen—that it attracts the eye, is of more gaudy colours, and showy. But we are to remember, in the first place, that it must *be bought*, it cannot be spun and woven at home when we might otherwise be idle, nor can we cultivate the cotton plant at home—all requires money, an outlay earned in some other line; and secondly, that one yard of good home-made linen will wear at least twice as long as the muslin or calico, and therefore it will require two cotton articles for one linen, and the time or money spent in making up the cotton articles is double that of the linen, two dresses for one; besides, the linen is easier kept clean, and we universally find a neighbourhood or country where the females use and dress in linen, that they are tidier and cleaner than where the muslin is the fashion—Holland, Belgium, and the north of Ireland are examples. All these matters taken into consideration, it is obvious that the home made article is the better, in the end cheaper, and ought to be encouraged, particularly in parts of the country where there are no other kind of manufactures; and that the home manufacture of linen ought to go on *pari passu* with the machinery, whether the latter be employed for linen or cotton. Let the people manufacture for themselves, and the extensive manufactures for the foreign market. The manufacture of linen by machinery in the north is now an important and thriving trade; we could wish to see it extended over the country. It is necessary to compete with the foreigner, it brings money into the country, gives a great deal of employment, and is a ready and lucrative market for the extensive farmer who cultivates for sale; but it does not follow that the domestic home manufacture should be neglected—the two systems are by no means incompatible, each in its respective line is well calculated to benefit and enrich the country.

## CULTIVATION OF FLAX.

It would be unnecessary here to enter minutely into

the growth and management of the flax crop; this subject has lately been ably handled by many competent persons, and almost every thing at present known on the subject has been fully discussed and laid before the public; nevertheless it is certainly the case that much bad management, error, and prejudice prevails among flax growers, even in the most forward districts. The absence of scientific knowledge, the strong attachment to old customs and opinions, and the neglect or repugnance to receive information from books, which prevail to a great extent among the farming classes, have kept them almost at a stand-still on this, as well as many other subjects connected with their business. The superiority of the Belgian flax in our markets is acknowledged, or our own treated in the Belgian system; their superior mode of culture in preparing the ground, and manure for the crop, and their after management, is notorious; and notwithstanding the indefatigable exertions of the Flax Improvement Society to disseminate correct principles and practice, to lay before the Irish farmers the superior management so successful in other countries it so happens that perhaps three-fourths of them are following out their old, absurd, and unprofitable course. Ignorance cannot at the present time be pleaded as an excuse for such conduct. The Flax Improvement Society has taken much pains to circulate knowledge in various ways, by their annual reports and instructions, and verbally in different localities by the young men who have been specially appointed to acquire and disseminate correct knowledge and practice on the subject in various districts. From the public press also some excellently written articles have lately issued, containing almost every thing known on the subject of flax culture. One of the most important appeared about two years ago, in the form of a treatise, written by Mr. Sproule, editor of the Irish Farmer's Journal, and to which we would particularly direct attention. This little work is equally comprehensive, simple, correct, and cheap; if therefore our cultivators are anxious or willing to acquire knowledge on the subject, and improve their practice, there are few difficulties stand in their way.

Though we think it superfluous to travel over the beaten track of flax cultivation, we may be permitted to offer a few hints on the subject which have from time to time been suggested by practical experience and observation. One of the greatest objections to the extension and general cultivation of the crop has always been its fickle and unsteady character, the uncertainty of producing good average crops on an average of years, and generally over the country. Inconstancy is a serious objection to any crop; no matter how valuable a hit one at intervals may be, one or two failures will sadly reduce the average value. But here the great point which we ought to determine will be, is there in the nature of the crop itself, in the soil, climate, or other circumstances of this country, over which we have no control, any peculiarities which render it uncertain and unsteady? or is inconstancy produced by ignorance of its nature and properties, by injudicious culture both as regards the preparation of the soil and manure, with other circumstances which skill and good management may obviate and remedy? To solve this pertinent question we may again revert to Belgium, where we find the flax a steady crop, and yet the soil and climate are not equal to ours. The mild climate of this country, with our deep and kindly soil, ought to be peculiarly favourable for the growth of flax; and we have, in numerous instances, proof positive that it is so where justice has been rendered. Flax is by no means tenacious of either climate or soil with us. We have it in the north upon various kinds of soil—the alluvial and heavy clay, the gravelly and sandstone formations, and even upon peat; in the south and west we have seen it grow on various soils and situations, and under many disadvantages. At this time a splendid crop is to be found growing on the demesne of Kippure in county Wicklow, on a soil composed of disintegrated granite and peat, and at an elevation of from 1,200 to 1,400 feet above the level of the sea. From these facts we may fairly conclude that it is chiefly from bad management and culture that our flax crops are inferior and uncertain, and not from the disadvantages of soil and climate. A very general opinion prevails, whether founded on facts and experi-



ence we are not at present prepared to state, that our finest limestone soils in Leinster and the midland counties are not favourable for the growth of this plant. We are aware that an excess of lime is not good, but in what is termed our limestone soils there is not an excess, and it is more than probable that skill and good management might obviate the difficulty, if such does really exist; and we believe that it may and ought to be cultivated more or less in every part of our island.

There are a few peculiarities and habits attending the flax crop, which have been observed, and are now generally recognised by all skilful and experienced growers, and which ought to be strictly kept in view by those who would succeed in its cultivation. In the first place, the crop will be more certain, and in every respect superior, both as regards quantity and quality, upon land that had been recently broken up from pasture or old lea, fresh after rest, and containing what we would call a stamina; and that a succession or repetition after a short interval on the same land, though rich and of superior quality, the crop will not succeed, it will be *chancy*. Now this fact at once suggests the importance and necessity of a judicious rotation of cropping, and the keeping of the same crop far asunder on the same land; this is prudent with all crops, but especially the flax. It was formerly the universal custom to sow it after potatoes, when the land is comparatively rich and clean; but latterly, and at present, it has been considered prudent to sow it after a wheat or oat crop. And this is decidedly its proper place in a rotation, if we did, like the Belgians, give the land a good dose of liquid manure before sowing it; but it is rare in this county to find land in a condition to produce two such crops as wheat and flax without an intermediate manuring. A moderate proportion of flax may be taken in any of our common rotations, by alternating the crop in different sides of the field during different courses; take one side, or portion of a field in one course, and reverse the sides or portion on the second or third course. By these means, in the common four course shift, flax or any other crop may be kept eight or twelve years distant on the same land; and in the five, six, or seven courses a still greater time. When discussing

the subject of rotations we recommended a course which would be both convenient and judicious, of having one field always lying in pasture for cattle and sheep to exercise on, and this field to be broken up at the end of the rotation, and another laid down in its stead, and during the same time; by this course the farm would all be rested and consolidated, and after a crop of oats this would be the obvious ground for the flax crop. This we would recommend to the consideration of our farmer friends who are inclined to grow flax extensively.

In preparing the ground for flax, another of its peculiarities must be kept in view. Though the soil should be well drained, deep, and rich, perfectly clean, well broken down and pulverised, yet it must not *be too loose*; it ought to be consolidated. The plant appears to penetrate and thrive best on a firm soil; the Belgians understand this well, and act accordingly. After deepening, cleaning, and pulverising the soil perfectly, they consolidate by passing repeatedly a heavy roller over it, then spreading their liquid manure, and allowing the surface to dry after absorption, then sow the seed, cover it *lightly* with a peculiar harrow, or implement with wooden pins somewhat like a common rake, and again roll down firmly; they never sow it on open loose ground, nor do they cover it deep, nor allow the surface to remain loose after the seed has been deposited. There is no such thing as ridge and furrow in a flax field in Belgium, to produce different qualities and lengths of stalk; their ground is drained and deep, and level as a table, all the crop of course alike in quality and length. In our management we are miserably deficient in all these important points, though our own experience might teach us the contrary. It has been well ascertained, that on ground after potatoes planted in lazy-bed, and after it has lain during the winter to consolidate, by merely sowing the seed and harrowing, the crop will be better than if the ground had been ploughed up and loosened; and for the same reason flax is seldom so good on drilled potato ground which is ploughed up in the spring and left open and lumpy. On the same principle wheat or oat stubble is ploughed early in the autumn, and left to consolidate

during the winter ; the seed is merely sowed upon it and covered in. But there can be no question that the Belgian practice is the best, cleaning and preparing the ground as for a green fallow crop, rolling down heavily according as the ground is tenacious or otherwise before and after the seed is sowed, leaving all level without ridge or furrow, which is essentially necessary for many crops besides flax ; but before we adopt this plan we must drain our land, which we ought to set about without delay.

The flax possesses another peculiarity in regard to its food, the manure required. We have not succeeded in applying farm-yard dung to the crop in the first instance ; from this we can have plenty of *stem*, but little fibre. Knowing this, we apply the dung to an antecedent crop. The Belgians also avoid the solid manure, but they apply another kind which is completely successful with them, and undoubtedly would be so with us, if our stupidity, prejudice, and carelessness did not prevent us from following so good an example. The great secret and chief point in producing a hit crop of flax is, that the seed shall be deposited at an early and proper season ; shall vegetate quickly, grow on steadily, without intermission, during the few months that it is upon the ground. If any thing interrupts and impedes this regular growth, such as badly prepared and poor land, drought during the spring months, or late frosts, in such case there will be failures. The crop may be slow of vegetation and early growth from some of the causes mentioned, in the first instance, and if the ground be rich and the after-season favourable, it will rush up suddenly into large bulk, but comparatively worthless, stem without fibre. Quick vegetation and steady growth, therefore, is, or ought to be, the chief object in view ; and this the Belgian farmer generally accomplishes, in the first place, by the superior preparation of the ground, but principally by his superior and stimulating liquid manure, which he applies in every instance. A great portion of this is the sewage of the neighbouring towns and villages, purchased and carried home to his tanks upon the farm, and allowed to be decomposed there ; this is particularly

rich in the phosphates, the inorganic food which the plant requires, it produces quick vegetation, supplies regularly the food of the plant, organic and inorganic, from the commencement to the termination of its growth, and this is perhaps the chief cause why the Belgians excel us so much both in the quantity and quality of the flax crops. It may be said that we have not the facilities for obtaining and preserving this manure as these people; but the fault is ours. There is nothing to prevent us, if the manure that is suffered to run in and pollute the rivers, to decompose in the streets, lanes, and yards of our towns, infecting the atmosphere and producing filth and disease, were carefully collected and applied as in Belgium. It is incalculable the quantity of crops and money that might be raised from this, at present corruptible source.

Irrespective, however, of town manure, liquid or solid, the farmer of every locality has resources upon which he may rely for a constant supply, not alone for his flax crop, but for others; the liquid manure which is slowly wending its way from his homestead every day and hour into the nearest gripe, pond, or river, would, if carefully preserved and applied, be found sufficient for many such purposes, and with little trouble or expense. We have no idea that every farmer should have an expensive tank constructed in every field, or even convenient to his housing and dung stead in the first instance. A capacious hollow, puddled with clay, or a few old barrels sunk in the earth, will suit his purpose, and a barrel with a common cart would carry it out to the fields; on the small farm a herring barrel with a wheel barrow or hand cart, and a couple of old pails or tin cans, to lift and distribute it, would be found quite convenient. The field intended for flax, after being in the autumn ploughed, or what would be much better *digged* over, could be saturated during the winter and spring months with the liquid, at all convenient times, and when it was to spare; it is not imperative that the liquid should be applied immediately before sowing the seed. If the ground be properly drained, it will absorb the fluid and retain all the important principles for the ensuing crop,

and promote its growth in an extraordinary degree. A variety of different methods might be adopted for carrying out and applying the liquid manure by persons anxious and willing to avail themselves of the many advantages they possess, but which are thrown away by carelessness and stupidity.

As to sowing, and the quantity of seed necessary, Mr. Sproule's treatise gives ample directions, and we consider them very correct; the quality also is of the greatest consequence, many frauds have been committed by importers and venders, therefore farmers ought to be strictly on their guard to obtain the article prime and fresh looking, and from persons of character and standing in the trade. Some late decisions in the courts of law and equity on the subject, will, we have no doubt, be of use in preventing mistakes in future. Much difference of opinion prevails as to the necessary acreable quantity of seed—some are inclined to sow more than others, many of our best cultivators are sowing thick, for the purpose, as they think, of producing more fibre and of a finer quality; but if the chief object be the saving of seed, it ought to be sowed rather thin, about three bushels to the statute acre is the medium quantity, and in all cases it ought to be regularly scattered; it requires considerable skill and practice to perform this operation properly.

We import our seed chiefly from America, Holland, and Riga; the latter is now rather the favourite kind, but each has its advocates. The success must in a great measure depend upon the nature of the soil on which it had been grown, and on which it is again to grow, whether it be a good change or otherwise; all this must depend on chance with imported seed, but did we raise and save our own, as we ought to do, we could manage to alternate the seed and soils advantageously.

Much care and attention are required in weeding the flax crop, and at a proper time of its growth, so that it receive no injury by treading down; likewise, the time and manner of pulling it require both judgment and nicety. It ought to be taken rather green than otherwise, and this is the practice where the cultivation is best

understood. This will produce fibre of a better quality than if allowed to stand and over-ripen; besides the seed will not be deteriorated, which in every case ought to be saved with the greatest economy. We hope that in a short time no farmer will be so insane as to neglect the saving of his seed, which is a most important part of the crop; and the process is both simple and easily accomplished. It only requires a slight trial to prove the excellence of flax seed for feeding all kinds of stock; the crop would pay well for this purpose alone.

The steeping process is one of the nicest points in the management of the flax crop, at least so far as the saving and quality of the fibre is concerned. It is in general very badly understood and conducted. The great error committed is on the side of caution, the dread lest the crop may be rotted or injured in the pond; it is, therefore, very seldom allowed to remain a sufficient time to allow the stem and fibre to separate freely, and the consequence is, it must remain too long on the grass. This is injurious to it through all the after processes of cleaning and handling which it has to undergo. In our early days we had a very simple test for ascertaining when flax was sufficiently watered, and which we always found correct. When it had been the regular time in steep, according to the water and state of the weather, we took up a *beet* or bundle, and selected from the centre a few stalks; these we broke into lengths of *two* inches from top to bottom, and tried if the stem of these lengths would pull out readily clear from the fibre. If so, we removed the whole from the pond and spread it on the grass. If the stalk held firm to the fibre and did not readily separate, we let it remain in the steep for a longer time. Many different modes are adopted for ascertaining this point. It requires some skill and caution; for if flax be spoiled in the watering, by allowing too short or too long a time, it will be seriously injured in the cleaning and after management, and will be an inferior articles for all purposes; it will suffer both in quantity and quality. It ought to be so well watered that a good drying on the **grass** would be sufficient. If it be brought out hard or tough, it will require a long time on the **grass**, which is highly prejudicial to the fibre afterwards.

As to the after management and cleaning process, it is not necessary that we should particularly allude. This is generally done by competent and skilful hands, who make it their trade and business, and where machinery is used it is now in general well done. But it may be of great importance if the cultivation of flax be encouraged and extended over the country, that hand-scutching be correctly taught in the different localities to obviate the want of flax mills, and be a source of employment for the people when they might otherwise be idle. We have understood that a system of factorage has been commenced in the north; that is, persons of skill and experience in the management of the crop purchasing it growing, on the foot from the farmers, at a certain acreable rate, taking upon themselves the after management and preparing it for the market. This system has been long practised on the continent, and most successfully; we could wish to see it general in this country. It is an excellent division of labour, and not only beneficial and remunerative for all the parties, but would encourage the growth by the extensive farmer, give employment to the poor, and produce a better and more abundant article for our manufacturers.

---

## CHAPTER XXVI.

### DAIRY MANAGEMENT.

THE secret of successful farming at the present day, whether on an extensive or small holding, is acknowledged to be the cultivation of green crops, and the rearing and feeding of cattle extensively, according to the size of the farm. The green crops and cattle are valuable particularly on two accounts—as the source of manure, and the ready means of making money. The farming community have too long held to and depended on the grain crops, which have impoverished and exhausted the land, without returning a fair and adequate

compensation. If this has been the case hitherto, we may expect that it will be more so in future, when free trade in corn throws us into competition with all the world. But another serious obstacle stands in our way, a difficulty that must be met and obviated: the potato, which has been the principal food and sustenance of the masses, has threatened to leave us; and should this be the case to any serious extent, the chief part of the grain will be required for home, for domestic use, and consequently comparatively little can be spared for sale. Some other modes of providing the means of paying rents and other expenses must be resorted to. But a mode has already been adopted, and when persevered in and carried out with skill, has been found perfectly successful; that is, depending chiefly on the animals of the farm, the cattle, sheep, and swine, for these latter purposes. Large sums of money are annually brought into this country from England by the sale of our cattle, sheep, and pigs, the principal part however finds its way into the pockets of capitalists, middlemen, and graziers, who spend little in the employment and support of the people. The small farmer receives but little of this, except for his pigs, the greater number of which he ought to consume at home. It is upon the dairy he ought to depend—upon the produce of his cows, milk, butter, and cheese; and for these, particularly butter and cheese, he has an excellent and ready market at all times and seasons, if he will only make the article that suits; and to this important and particular object his most serious and unremitting attention should be directed. It is astonishing the quantity of butter that is consumed in the cities and manufacturing towns of England, not to speak of our home consumption. There is no likelihood that ever such markets can be glutted by an over supply; we have therefore a most cheering and extensive prospect before us. And the consumption would still be much greater were an article of a superior quality to be exhibited in the different markets at all seasons. *Good butter* is always both scarce and dear in the London, Liverpool, Birmingham, and Manchester markets, particularly during the winter months. An inferior article



can generally be had in abundance, but of course at a low price. There are two great classes of consumers in England, the nobility, gentry, merchants, and such like, with the principal hotels; the other, the lower classes, tradesmen, mechanics, labourers, coal porters, &c., &c., in fact the masses. The wealthy classes purchase the fine superior butter—they are able and willing to give a high price for a good article; they buy the fresh butter sent up from different parts of England, Epping Forest, Cambridge, Dorset, &c., &c., likewise the foreign, Dutch, Flemish, and Friesland. They would readily purchase fine fresh Irish butter also if it could be obtained, but such an article is rare in the market. The lower classes, again, are contented with an inferior article at a reduced price, and are the consumers of our common salt and rancid Irish butter. This will in a great measure explain the difference in the market prices of foreign and Irish butter, and the great difference in the quantities usually exhibited in the English markets. In looking into the London weekly market note we usually find the quantity imported on an average as two to one in favour of the foreigner—that is, from 4,000 to 6,000 firkins of Dutch and Friesland, and from 2,000 to 3,000 of Irish; and the price from twenty to forty per cent. in favour of the foreigner. Now we would seriously ask our countrymen (and women too), is this a satisfactory state of things, and should such exist? Should the phlegmatic Dutch and German *crow*, so far excel our active, quick-witted, and intellectual countrywomen, in the production of this most important article of commerce, and monopolise both quantity and price in our own markets, and at our very doors. We are quite aware that the foreigner has an advantage in the *character* of the article, irrespective of the quality. The extreme cleanliness of the females on the continent; their houses, dairies, and every thing connected with their domestic economy, contrast sadly with our smoky, and, in many instances, filthy cabins, and even farm-houses. The English people, themselves clean, will prefer the butter made in a country where univereal particularity prevails, to that from another quarter, where the case may be ques-

tionable, unless they find in the quality of the article itself convincing proofs that skill, attention, and cleanliness must have produced it. This prejudice does exist and to a serious extent, among the best buyers and wealthy consumers, and until we set to in earnest, "and put our houses in order," we shall not be able to wear it off. We grant there are among us particular and cleanly females who are very indifferent butter and cheese makers, and others that are not quite so nice in their habits that will send out a more marketable article; but the best among us have room to mend, and in every thing connected with the management of milk, butter, and the dairy, particularity is indispensable. If the increase of cattle, house-feeding, and the produce of the dairy is to extend and be depended on by the farmers of Ireland, it is absolutely necessary that the female portion, their wives and daughters, shall be duly qualified, and willing to assist in carrying out the principle. It is chiefly on them that success or failure will depend, and this ought to be a very serious consideration. We know the energy, industrious, and emulative habits of our women, and what they will accomplish if they get encouragement and fair play; but we will be candid and warn them, we fear the great majority at present are not at all up to the mark, they have much to learn. It is only in certain districts of the country, and in these, certain individuals, that can produce really good butter and cheese; the great majority are wholly or partially ignorant of the matter, and how to remove this ignorance, and spread a general knowledge on the subject, is a matter of the deepest importance to the best interests of all classes.

It has occurred to us that a very simple, obvious, and ready expedient might be adopted to extend the knowledge of the dairy to every part of the country. It has long been a custom in some of our northern counties, and generally through Scotland, that all the young men, (prudent of course) farmer's sons, before tying themselves to the world, and choosing their helpmates, take special care each to select a good butter and cheese maker, a competent manager in the dairy. This has produced the

best effects on all hands. In the first place, it secures the success and prosperity of the man in after life, and it puts the females on their guard, on their *mettle*. From infancy they have the proper objects, the main chance in view; their education is in the proper direction, they spend no time in silly or trivial matters, nor is their attention distracted from what may tend to their future welfare and happiness. Now we can see no good reason why this excellent custom should not become general and be carried out into every part of the country; it is quite practicable, for we pledge our reputation that if the *boys* will only (we will not say combine, we do not like the word) but *resolve* to reject every candidate who is not a competent hand in the dairy, a good butter and cheese maker, that the ladies will set to and qualify for situations forthwith. We say in sober seriousness that we do not at present know a more likely mode of carrying out a great principle than that we have suggested.

Various modes besides might be resorted to with great success and the best effects. Agriculturists are employed in certain districts to teach farmers how to drain and raise green crops; why not employ competent females, in the same manner, to give instruction in dairy management, to go from house to house on the days of churning and cheese making, and direct the operations. A few such lessons in a tractable family would be sufficient for all after purposes; and if gentlemen, societies, or poor law unions would resolve to try the experiment, we will engage to supply any number of competent persons from the counties of Down and Antrim, and be security for their capabilities. We send our sons abroad to be taught farming, why not send our daughters to districts and parts of the country where dairy management is best understood and practised, for a like purpose? We will further engage to procure situations in private families in the forementioned localities where respectable females may be safely located for a time, and at a moderate expense, where they may see not only the best dairy management, but likewise the best house-keeping and economy. These matters are certainly worthy of consideration.

## MANUFACTURE OF BUTTER.

The essential difference in the appearance and quality of the foreign and Irish butter in the English markets is,—the foreign is all of one colour, taste, and freshness, there is no difference in the firkin from top to bottom; in the Irish, in general, there is a great distinction in the same firkin: it is of different colours, tastes, and freshness, and it is in most cases *far too salt*. This is the grievous and common error of our butter, too much salt. It is erroneously supposed that salt will make it weigh well, and tend to preserve it longer. Butter will only dissolve a certain portion of salt and absorb it; if an excess be added, it will only partially dissolve, and the water of crystalization will remain stagnant in the butter and render it rancid, and we find that rancid butter is always too salt. Again, butter cannot be too carefully excluded from the air or any gaseous effluvia; it absorbs such with great rapidity, and changes its fresh taste. To be convinced of this, we have only to observe how soon the freshest and best made butter will change its taste in the cleanest dairy or larder if allowed to remain in the open air; all decomposing substances will act upon it and produce decomposition. It is partially decomposed when churned; the cream is so, has fermented and become acid, and of course the butter is affected, and if heat and air be present afterwards, decomposition will go on more or less, notwithstanding the application of salt. To exclude these latter conditions, heat and air, therefore is the great point; and if a firkin or other quantity of butter well made, put up speedily in a well seasoned close vessel, and in a cool situation, it will keep fresh and sweet for a considerable time. But butter, no matter how well made, if suffered to stand in the open air, in a hot situation, a dirty apartment, a bed room, near dung heaps or decomposing matter, such will deteriorate and spoil rapidly. On the continent scarcely any farmer makes his own firkin for market, factorage is the method pursued there; and such a system would be an excellent plan in this country also. In the farm

house the milk or cream is churned, the butter slightly washed, and immediately carried to the factor quite fresh and new. The latter has his people ready for the purpose. A considerable quantity comes in at a time from different quarters; they wash, mix, salt, and colour it; pack it closely into air tight vessels, and send it off at once to the English markets, fresh and new, all one colour and one quality, and when opened it distinctly shows its superiority. With the Irish farmer every thing is different. He cannot make a firkin in a day, in a week, or perhaps in a month; he commences in May and ends in July or August. The different quantities added may be of different qualities, different colours, different degrees of saltness; the top may be sweet and the bottom rancid and stinking. While such a system goes on, our Irish butter will always be despised, will be at a discount in the markets. The present is not a time to trifle in such matters; we must bestir ourselves, or be entirely driven from the markets. We have no legislative protection now, we must meet the foreigner on fair ground, as we hope to do successfully, and as has already been done. The northerns in Antrim and Down are competing with the Dutch and Friesland butter in the London market, and obtaining a higher price for a superior article. What is done in one locality is quite possible in another, if the same means be taken and skill used. We consider it one of the happiest circumstances in our life to have been the humble means of drawing the attention of the people in the north to the true state of the butter trade, and the means of its improvement. We wrote a series of articles a few years ago in "The Northern Whig," a paper of great and deserved influence in the north, for the purpose of drawing the attention of these persevering people to the subject. Our suggestions were attended to, the people saw the practicability of the recommendations. A Butter Improvement Society was formed in Templepatrick, in the county Antrim, for the purpose of carrying out the project; they were ably assisted by the Messrs. Rea of London, eminent merchants in the trade, and countrymen of our own, who brought the butter forward in the market, and got it a fair trial.

It was eminently successful, and continued so; it beat the foreign in quality and price. Other societies in Antrim and Down have been organized for the same purpose, and with like success, and these farmers are now reaping a rich harvest, the effects of their superior skill and energy. The Templepatrick people have demonstrated the important fact, that the foreigner can not only be fairly met, but beaten in the English markets. If, therefore, by a little attention and skill one portion of our people can accomplish this most desirable object, why should any part of the country hold back or lag behind. We should press forward, make one united simultaneous movement, and drive the foreigner out of the markets, and pocket the enormous sums of pure cash which have hitherto annually found their way to the continent. So good an example should be followed; societies on the principle of the Templepatrick should be organised through all parts of the country. No doubt every information regarding rules, regulations, and modes of procedure would be obligingly and amply afforded by the northern societies, and great improvements in the manufacture of butter would yet be discovered when the combined intelligence of the country is directed towards the subject. This might be a very proper subject for the Royal Agricultural Improvement Society to take up and recommend to the various branch societies through the country; no subject of more importance could occupy their attention.

If the proper precautions be taken, the making of good butter is a very simple process. Cleanliness in every part of the operation must be observed, from the milking of the cows to the closing up the firkin. In most parts of the country now, milch cows at all seasons get certain food, such as clover, cabbages, turnips, &c., which will communicate a disagreeable taste to the milk and butter; this, however, is easily prevented by a little solution of nitre in the milk. Take nitre (saltpetre) three ounces; water luke-warm, one quart; dissolve and bottle for use. Into each *ten quart* milking pail, pour one wine glassful of the solution, and milk upon it; this will be sufficient, and no more nitre need be added to the but-

and promote its growth in an extraordinary degree. A variety of different methods might be adopted for carrying out and applying the liquid manure by persons anxious and willing to avail themselves of the many advantages they possess, but which are thrown away by carelessness and stupidity.

As to sowing, and the quantity of seed necessary, Mr. Sproule's treatise gives ample directions, and we consider them very correct; the quality also is of the greatest consequence, many frauds have been committed by importers and venders, therefore farmers ought to be strictly on their guard to obtain the article prime and fresh looking, and from persons of character and standing in the trade. Some late decisions in the courts of law and equity on the subject, will, we have no doubt, be of use in preventing mistakes in future. Much difference of opinion prevails as to the necessary acreable quantity of seed—some are inclined to sow more than others, many of our best cultivators are sowing thick, for the purpose, as they think, of producing more fibre and of a finer quality; but if the chief object be the saving of seed, it ought to be sowed rather thin, about three bushels to the statute acre is the medium quantity, and in all cases it ought to be regularly scattered; it requires considerable skill and practice to perform this operation properly.

We import our seed chiefly from America, Holland, and Riga; the latter is now rather the favourite kind, but each has its advocates. The success must in a great measure depend upon the nature of the soil on which it had been grown, and on which it is again to grow, whether it be a good change or otherwise; all this must depend on chance with imported seed, but did we raise and save our own, as we ought to do, we could manage to alternate the seed and soils advantageously.

Much care and attention are required in weeding the flax crop, and at a proper time of its growth, so that it receive no injury by treading down; likewise, the time and manner of pulling it require both judgment and nicety. It ought to be taken rather green than otherwise, and this is the practice where the cultivation is best

understood. This will produce fibre of a better quality than if allowed to stand and over-ripen; besides the seed will not be deteriorated, which in every case ought to be saved with the greatest economy. We hope that in a short time no farmer will be so insane as to neglect the saving of his seed, which is a most important part of the crop; and the process is both simple and easily accomplished. It only requires a slight trial to prove the excellence of flax seed for feeding all kinds of stock; the crop would pay well for this purpose alone.

The steeping process is one of the nicest points in the management of the flax crop, at least so far as the saving and quality of the fibre is concerned. It is in general very badly understood and conducted. The great error committed is on the side of caution, the dread lest the crop may be rotted or injured in the pond; it is, therefore, very seldom allowed to remain a sufficient time to allow the stem and fibre to separate freely, and the consequence is, it must remain too long on the grass. This is injurious to it through all the after processes of cleaning and handling which it has to undergo. In our early days we had a very simple test for ascertaining when flax was sufficiently watered, and which we always found correct. When it had been the regular time in steep, according to the water and state of the weather, we took up a *beet* or bundle, and selected from the centre a few stalks; these we broke into lengths of *two* inches from top to bottom, and tried if the stem of these lengths would pull out readily clear from the fibre. If so, we removed the whole from the pond and spread it on the grass. If the stalk held firm to the fibre and did not readily separate, we let it remain in the steep for a longer time. Many different modes are adopted for ascertaining this point. It requires some skill and caution; for if flax be spoiled in the watering, by allowing too short or too long a time, it will be seriously injured in the cleaning and after management, and will be an inferior articles for all purposes; it will suffer both in quantity and quality. It ought to be so well watered that a good drying on the grass would be sufficient. If it be brought out hard or tough, it will require a long time on the grass, which is highly prejudicial to the fibre afterwards.



and promote its growth in an extraordinary degree. A variety of different methods might be adopted for carrying out and applying the liquid manure by persons anxious and willing to avail themselves of the many advantages they possess, but which are thrown away by carelessness and stupidity.

As to sowing, and the quantity of seed necessary, Mr. Sproule's treatise gives ample directions, and we consider them very correct; the quality also is of the greatest consequence, many frauds have been committed by importers and venders, therefore farmers ought to be strictly on their guard to obtain the article prime and fresh looking, and from persons of character and standing in the trade. Some late decisions in the courts of law and equity on the subject, will, we have no doubt, be of use in preventing mistakes in future. Much difference of opinion prevails as to the necessary acreable quantity of seed—some are inclined to sow more than others, many of our best cultivators are sowing thick, for the purpose, as they think, of producing more fibre and of a finer quality; but if the chief object be the saving of seed, it ought to be sowed rather thin, about three bushels to the statute acre is the medium quantity, and in all cases it ought to be regularly scattered; it requires considerable skill and practice to perform this operation properly.

We import our seed chiefly from America, Holland, and Riga; the latter is now rather the favourite kind, but each has its advocates. The success must in a great measure depend upon the nature of the soil on which it had been grown, and on which it is again to grow, whether it be a good change or otherwise; all this must depend on chance with imported seed, but did we raise and save our own, as we ought to do, we could manage to alternate the seed and soils advantageously.

Much care and attention are required in weeding the flax crop, and at a proper time of its growth, so that it receive no injury by treading down; likewise, the time and manner of pulling it require both judgment and nicety. It ought to be taken rather green than otherwise, and this is the practice where the cultivation is best

understood. This will produce fibre of a better quality than if allowed to stand and over-ripen; besides the seed will not be deteriorated, which in every case ought to be saved with the greatest economy. We hope that in a short time no farmer will be so insane as to neglect the saving of his seed, which is a most important part of the crop; and the process is both simple and easily accomplished. It only requires a slight trial to prove the excellence of flax seed for feeding all kinds of stock; the crop would pay well for this purpose alone.

The steeping process is one of the nicest points in the management of the flax crop, at least so far as the saving and quality of the fibre is concerned. It is in general very badly understood and conducted. The great error committed is on the side of caution, the dread lest the crop may be rotted or injured in the pond; it is, therefore, very seldom allowed to remain a sufficient time to allow the stem and fibre to separate freely, and the consequence is, it must remain too long on the grass. This is injurious to it through all the after processes of cleaning and handling which it has to undergo. In our early days we had a very simple test for ascertaining when flax was sufficiently watered, and which we always found correct. When it had been the regular time in steep, according to the water and state of the weather, we took up a *beet* or bundle, and selected from the centre a few stalks; these we broke into lengths of *two* inches from top to bottom, and tried if the stem of these lengths would pull out readily clear from the fibre. If so, we removed the whole from the pond and spread it on the grass. If the stalk held firm to the fibre and did not readily separate, we let it remain in the steep for a longer time. Many different modes are adopted for ascertaining this point. It requires some skill and caution; for if flax be spoiled in the watering, by allowing too short or too long a time, it will be seriously injured in the cleaning and after management, and will be an inferior articles for all purposes; it will suffer both in quantity and quality. It ought to be so well watered that a good drying on the grass would be sufficient. If it be brought out hard or tough, it will require a long time on the grass, which is highly prejudicial to the fibre afterwards.

of commerce and consumption in every part of the country, town, and city, were proper attention directed to it, and were it produced in abundance, as it might be. Hitherto we have not turned our attention to the manufacture of cheese in Ireland; it has been sadly neglected. It is only in a few localities that it has been tried at all, and by only a few individuals, these in general imperfectly acquainted with the process, and of course producing an article of inferior quality; this has raised a prejudice, and produced a most erroneous and pernicious idea, that good cheese cannot be made in Ireland at all, that the soil, or the climate, or something else undefined and unknown, is unfavourable to it. This is exactly in keeping with old opinions of farmers—that certain soils and situations would only produce certain crops, and it was useless to attempt any change for the better; but such antiquated notions must now be dissipated, we must not travel in the old beaten paths, we must not adopt second-hand opinions, we must think and act for ourselves, and judge from experience. Even in England it is erroneously supposed that only certain districts or counties will produce good cheese; Cheshire or Gloucestershire for instance. It is the fact at present; but why is it so? Simply because the people of these districts know well how to manage it, they have been educated and well trained to the process, and they are therefore clever and expert at the business. The excellent cheese of Cheshire or Gloucester does not depend upon the peculiar soil of these districts, nor upon the breed of cattle; it altogether depends upon the superior skill and knowledge of the people, derived from long habit and experience. Can it be for a moment supposed that the soil of England, Cheshire or Gloucestershire, or the poor thin cold soils of the west of Scotland, that produces the delicious Dunlop and Ayrshire cheese, is at all to be compared to some of our midland counties—Meath, for instance, and Roscommon. The idea is ridiculous. We have every advantage—the best of soil, the best of cattle; all we want is knowledge and inclination to make the attempt. But we have proof of these facts at home; in several parts of the country skilful individuals have made most

excellent cheese on some of the poorest soils in the country. In the counties of Down and Antrim, cheese is made of good quality, and found to be a very profitable business; it will always be found so where tried. The Archbishop of Dublin told us that he eat cheese made in Ireland as good as the best Gloucester or Cheshire, and it will be admitted that His Grace is no mean judge, himself an Englishman, and of course used to the best cheese that could be procured every day. We have also heard the opinions on the same subject, and to the same effect, of the late lamented Bishop of Kildare. And if this be the case, if one or more individuals in the country can accomplish this, why not others? Therefore, why should Ireland not be a cheese as well as butter country? There is always a good market for cheese, and there would be still a greater demand if the article could be obtained at a fair price, and if our people were to get into the use of cheese as people of other countries are. Cheese of a medium quality in Dublin is sold at 10*d.* per pound, the best is 1*s.* to 1*s.* 2*d.*, and all this is imported and takes money out of the country. The consumption of Dublin alone, would diffuse a great deal of money among our farmers were they alive to their own interests. But even were our people, in the first instance, unable to produce a superior article for the market, were they to make cheese for their *own use*, for domestic consumption, they would add immensely to their means of subsistence and to their comforts. One of the greatest faults that attend our peasantry, are want of skill in their domestic affairs, want of economy, and a taste for superior living; this makes them contented with the most simple diet, and chiefly of one kind: they have no idea of variety. This is a positive evil at the present time. Our peasantry have been contented with the potato, and that alone, and upon the potato they have depended; this food will now apparently leave us, and where shall we look for a substitute? Had we been used to oatmeal, beans, peas, and other vegetable diet, the loss of the potato would not have been so seriously felt; but as it is, we must change our system, we must use bread in greater quantities, and

there could not be a more wholesome adjunct than cheese. Any man may make a meal of bread and cheese, and as we can rear wheat and oats, and may make our own cheese if we choose, we may be independent of the world for all the common necessaries and even comforts of life. In the north, and in Scotland, where the farmers make cheese, a considerable portion is consumed by the inmates of the household, as a necessary, nutritious, and convenient food. In England every person eats cheese who can make or purchase it; there it is considered a necessary and important part of the dietary of the middle and lower classes. We need not say that the nobility and gentry use it every day. But in the greater part of this country, it is seldom used or thought of; our people deprive themselves of a very common luxury through their neglect and want of economy. There is no plain food that will enable a man to get through a severe day's work better than oat cake and cheese with a drink of beer, milk, or even water. It is also convenient and can be carried in small bulk, in the pocket or otherwise. Our honest, respectable, and comfortable farmers in the north, will go abroad for a day to market or other business with a piece of bread and cheese in their pocket; this with a pint of beer will bring them back safe at the expense of a few half-pence, and this is one of the reasons why they are comfortable and respectable.

There is a much greater variety in the kinds and qualities of cheese that is made in different parts of the world than of butter; almost every country and even locality has its peculiar quality and denomination. On the continent, Italy, Switzerland, and Holland are the most famed for their cheese, which they make in great variety and with much skill. A considerable portion of the exports of those countries are of that article; some of this from certain localities is purchased as luxuries at a high price by the wealthy. The celebrated *Parmesan* cheese made in Lombardy, and the different rare kinds of *Swiss*, are examples; these, however, are prized and purchased more from curiosity than real utility. In point of value and excellent quality no country in the world can excel or even approach Great Britain. The *Stilton*, Gloucester, Cheshire, and Dunlop cheese may

defy competition. Of late a new market has been opened, and a formidable rival has appeared in the American cheese. What has been offered here for sale is of fair quality, and as it can be sold at a moderate rate, is likely to come into general use; so that if we do not mind our affairs brother Jonathan is very likely to slip considerable sums of money from among our fingers.

All the different kinds and qualities of cheese may be very simply classed into good and bad, rich and poor, and these conditions will be altogether produced by management, skilful or otherwise. Poor cheese may be of good quality, and rich very bad; the state in which the milk is used will produce rich or poor. When new milk immediately from the cows, and containing the cream, is used, the produce is called new milk cheese; this is rich and in general fine, and sold at a high price, such as the Gloucester, Cheshire, Dunlop, &c. When the milk has been allowed to stand for some time, the cream skimmed off to make butter, the produce is called skimmed milk cheese; this is comparatively poor, and sold at a low price, but it is very excellent food, palatable and nutritive. Much of this kind is made in the north, and in Scotland, for home use and even for the market. It will be readily sold at from four-pence to six-pence per pound. Much of what we purchase in Dublin at ten-pence is skimmed milk cheese. Except in countries or localities where fine rich cheese is made for sale, and a high character established, perhaps the most profitable and safe course is to make butter and skimmed milk cheese. The farmers in the northern counties adopt this plan, and find it very profitable indeed; it is only on certain occasions and for special purposes that a new milk cheese is made at all. They have in the first place the butter, secondly, the cheese, and for feeding pigs and other purposes the whey is nearly as good as buttermilk. This plan we would strongly recommend for adoption by our farmers in general through all parts of the country, particularly at first; and if at any future period, by experience and practical knowledge, we become eminent and obtain a character, we may then safely try the new milk and the fine kinds.

Milk is a very compound substance, and contains nearly all the elements and proximate principles of animal nutrition; the chief of the latter are, butter, *casein*, and whey. When the butter is extracted the *casein* or cheesy part and the whey remains; any acid will separate these, the *casein* will coagulate and form curd, and the whey will remain a thin fluid. The best and true acid for separation is obtained from the stomach of a young calf, and is called rennet; the best is obtained from a fed veal calf. The stomach must be washed, salted, and then dried for a time like ham or bacon; it ought to be kept over for twelve months if convenient. One stomach will make fully one quart of rennet or *steep*, and this it will do repeatedly, say three times, but in the intervals it must be hung up and dried as at first. To prepare the rennet or *steep*, the usual way is simply to infuse the bag in water that had been boiled and suffered to cool during at least twenty-four hours, then hang it up again to dry; the liquor will be fit for use. But some infuse sweet herbs, as sweet briar, dogs' rose, &c., and add a lemon with some cloves, which gives the rennet a superior flavour. The quantity of this to be used in the milk will be according to its strength and other circumstances, and can only be ascertained by trial and experience. In general, however, it will be found that half a pint of rennet or *steep* will coagulate fifty gallons of milk. On the continent *muratic acid* is used for the same purpose, a small quantity diluted with water is put into the milk; but in England and Scotland the rennet is preferred. It might be well if some of our eminent chemists would turn their attention to this subject, and produce a more simple and easily prepared ingredient for the purpose.

It is usual to add some colouring matter to the cheese for the purpose of giving it a yellow rich colour; this is very properly dispensed with in Scotland. In general marigolds and turmeric is used, but Spanish *arnatto* is best. A small quantity is put into a linen bag and dissolved and added to the milk somewhat like blue in the water for clothes.

In setting the milk or curd, it must, in the first in-

stance, be brought to somewhat a high temperature. New milk warm from the cows will set if rennet be immediately added, but skimmed milk, or that which has been suffered to cool, must be brought to a heat of from eighty to ninety degrees, and when the rennet is added, covered up, and allowed to stand one and a half or two hours, it will be set, and the curd fit for breaking down; this is done with a saucer, a skimming dish, or a small cheese knife for the purpose. This should be passed across and through it repeatedly, when the curd will sink and the whey may be taken off. The curd must afterwards be well rubbed and pressed with the hands and salted, the quantity of salt will altogether depend on taste; in general one pound of salt to from forty to fifty of curd. Some press the curd fresh, and afterwards rub in the salt as with meat, or steep the cheese for a time in pickle, but to salt the curd before pressing is the most common method.

Pressing the curd is the next operation, and requires skill and care; all the whey must be pressed out and by degrees, too much weight must not be put on it at first. The curd after salting should be rolled in a clean cloth and placed in a cheese vat, a vessel made for the purpose, with holes in the bottom and sides to allow the whey to escape; the weight is then applied and increased as desirable. The curd or young cheese must be frequently taken out and turned, and the cloths dry and clean renewed. One of the indications of a cheese being sufficiently pressed is, when the cloths that it was rolled in come out clean and dry. If a cheese is not correctly or sufficiently pressed, it will not be of good quality; it will spoil and become useless.

Cheese presses are of various kinds, some of them very ingeniously constructed, but for all common purposes a very cheap, simple, and efficient one can be made; as a lever, of a strong plank or board, one end fixed in the wall, at the height of the vat, the latter placed on a slate or some level surface, and at the other end any required weight of stones, which can be removed, increased, or diminished at pleasure.

When the cheese has been sufficiently pressed, which



it will generally be in three days, it must be removed and put upon a shelf or some convenient place to dry, and should be repeatedly turned two or three times a day during the first week, and at intervals afterwards.

It will be observed that the operation of cheese-making is simple, and easily accomplished; still, it will require considerable experience to produce an article of superior quality. All the various kinds are made on the same principle, and from the same substance, *casein*, the various tastes and qualities are produced, by the different states of the milk, modes of management, and the several ingredients, such as sweet herbs, and spices mixed with the curd. Full and ample descriptions of all these may be found in detail in several agricultural books and pamphlets, to which we would refer for further information, particularly "London's Encyclopædia of Agriculture," "Agriculture and Dairy Husbandry," by Jackson of Pennicuik, and an excellent essay on the manufacture of Cheshire cheese, in the last volume of the transactions of the Royal Agricultural Society of England.

---

## CHAPTER XXVII.

### PLEURA PNEUMONIA.

This fearful disease, which has produced such direful effects in different parts of the country, and which is still continuing, lingering, and carrying off numerous cattle, even in the districts where it first commenced, and extending its ravages into localities where it was hitherto unknown, threatening to spread over the length and breadth of the land, will now claim our attention, and a passing notice.

The reasons which induce us to allude to this subject at this time are, we have, during the last three years, unfortunately, had very considerable experience in the matter. We had a great number of cattle attacked, many

of whom died, and a great, nearly an equal number of which we succeeded in curing, and which are now in good health, and at the present time we are quite free of the disease. It becoming very generally known through the country that we had been so successful, a numerous correspondence poured in upon us from various parts where it had appeared, soliciting advice on the subject; these applications became so multiplied that we were reluctantly compelled to decline answering them, but to compensate for this apparent neglect, we will here give a brief description of our experience and treatment, in hopes that it may do some public service.

About three years ago, when this dire scourge first showed itself in our establishment, it was certainly of a different type from what it latterly assumed, though of the same general character, the symptoms at first varying in different animals, but eventually ending in a regular pulmonary disease, obliteration or congestion of the lungs, and ultimately consumption and death. At first the symptoms were more decidedly inflammatory, the pulse hard and quick, and the complaint ran its course in a shorter time; but, during the last year, though these symptoms were mitigated and the inflammatory action less apparent, still it was equally insidious, and though slow, equally fatal in its effects. To those who had seen it there could be no mistaking the leading and common symptoms, dull, dejected countenance, loss of appetite, and of milk, (sometimes these latter symptoms were not apparent until the disease had considerably progressed, and even the animal would milk and eat a little until near death,) but when saliva was discharged from the mouth, and the peculiar *grunt*, with the *short* consumptive and troublesome *cough* appeared, there could be no mistake about the matter. It very often occurs that the disease has made considerable progress before it manifests itself or is observed, and this is the dangerous part. Were it observed at the very commencement and treated properly, there would be every chance of success.

At the first when we observed the highly inflammatory symptoms, and with our cattle in high condition, we had no hesitation in bleeding largely, and opening

the bowels with an active saline purge, which we again repeated if necessary, likewise the bleeding; but we must admit, that when we had to resort to bleeding the second time, we did in no case succeed in a cure. If the first bleeding reduced the pulse, and we could succeed in keeping it down by *sedatives* such as white hellebore, we generally succeeded in a cure. This medicine from first to last has been the only successful cure, and latterly we tried nothing else. We used sudorifics and fever medicines, alteratives and purgatives, turpentine, nitre, tartar emetic, digitalis, blistering the sides, and all without effect; the *white hellebore* alone was our sheet anchor.

During the last year we saved 7 out of 10 beasts. Our uniform treatment was as follows:—whenever we noticed the disease we had the beast separated from its fellows, and removed into an airy, and at the same time comfortable shed, well littered and clothed. We do not now bleed at all, unless the beast is in high condition, and then in small quantities, say three or four quarts; we find that bleeding prostrates the strength of the animal, and assists the disease. If the bowels be constipated, or the excrement dark and fetid, we give an active saline purge, one pound epsom salts, one half-pint train or linseed oil, and one dram powdered ginger, all mixed in a quart of warm water, and poured *gently down* (every medicine ought to be poured gently down the throat of a cow that it may pass into the second stomach, and not into the paunch or first stomach). After the operation of this medicine, we commenced with the white hellebore, giving three drachms in the day (to a grown animal), morning, noon, and night, a drachm at each time, dissolved in a pint of decoction of linseed or thin gruel, and this has been our whole medical treatment, and this we will again pursue if necessary. Care must be taken to get the *hellebore prime and fresh*, from the Apothecaries' Hall or some such establishment; in country towns an inferior or spurious article may be obtained, which may be of serious consequence.

The state of the bowels must be watched, and if the hellebore acts violently and relaxes too much, the quan-

tity must be reduced or discontinued altogether for a few days.

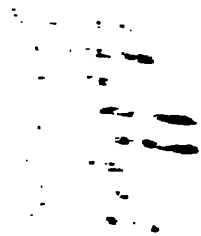
As much, *perhaps more*, of the success of the cure, depends upon the regimen and treatment, this must be paid particular attention to. No matter how anxious a greedy animal may be for food, it should be indulged in nothing but thin oatmeal gruel, and decoction of linseed two or three times a day, one, two, or three quarts at a time; and when there are evident symptoms of the disease going off, and the health and strength of the animal returning, it may have a slight bran mash twice a day, mixed with linseed meal, and the gruel more firm and substantial. Starvation, in the first instance, must be the order of the day; if any solid food, such as hay, straw, oats, turnips, or even grass, be given, before the animal can ruminate, (chew the cud,) this will throw it back and likely kill it; and even when it has recovered, it must be brought back gently, and by degrees, to its former food. It must be carefully watched, that it does not eat its litter during its illness.

These have been the precautions and modes of treatment we have adopted in all our latter cases of the disease; we do not say they are specifics, but they have been successful with us, and if our directions be correctly and scrupulously observed, we would anticipate the happiest consequences.

THE END.

11

12



Vertical line of text or a scanning artifact on the left side of the page.

