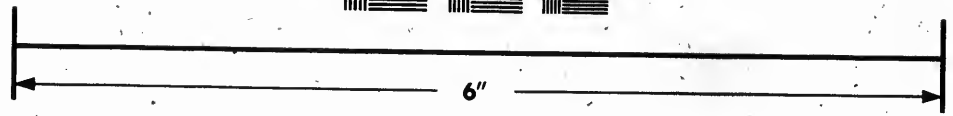
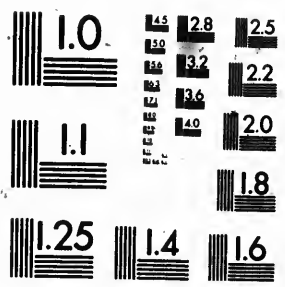
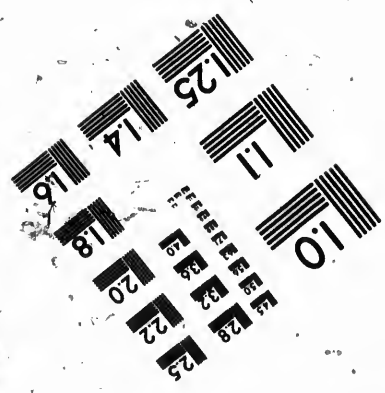


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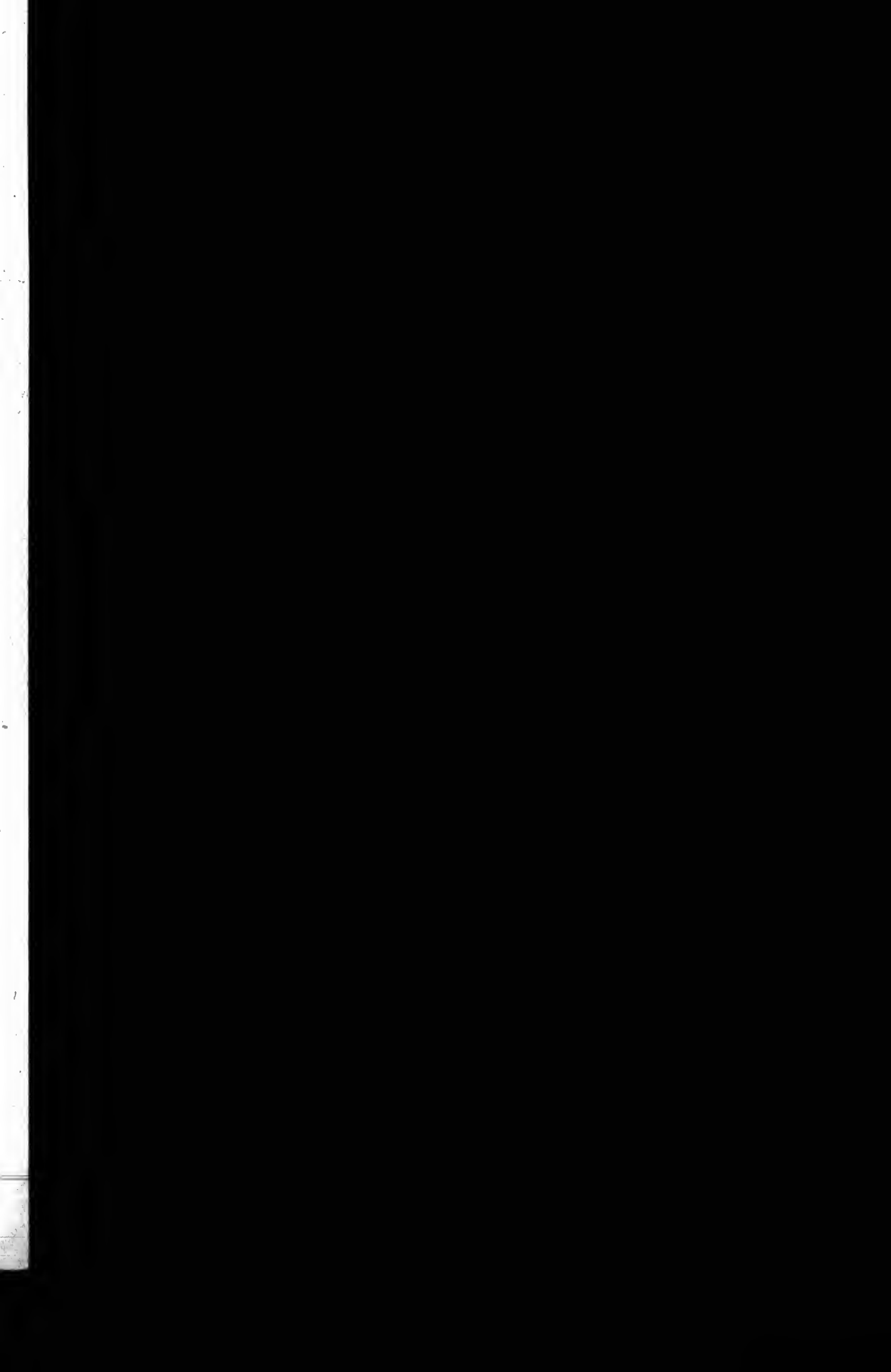
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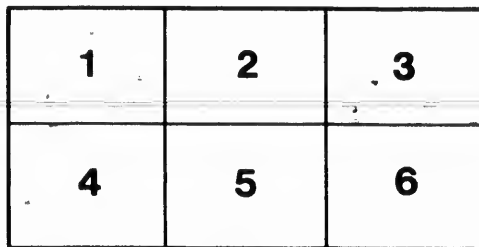
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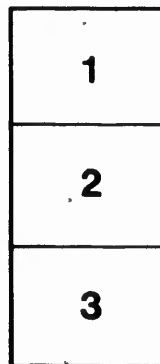
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Nov. 22^d 1854.

PRACTICAL HINTS
TO THE
FARMERS OF NOVA-SCOTIA
ON THE
MANAGEMENT AND IMPROVEMENT
OF
LIVE STOCK,
AND ON
GENERAL HUSBANDRY ;

COMPILED FROM YOUATT, JOHNSTON, PETERS, STEPHENS,
and other late writers.

WITH NOTES AND EXPLANATORY REMARKS.

BY J. W. DAWSON,

AUTHOR OF "SCIENTIFIC CONTRIBUTIONS TOWARD THE IMPROVEMENT OF
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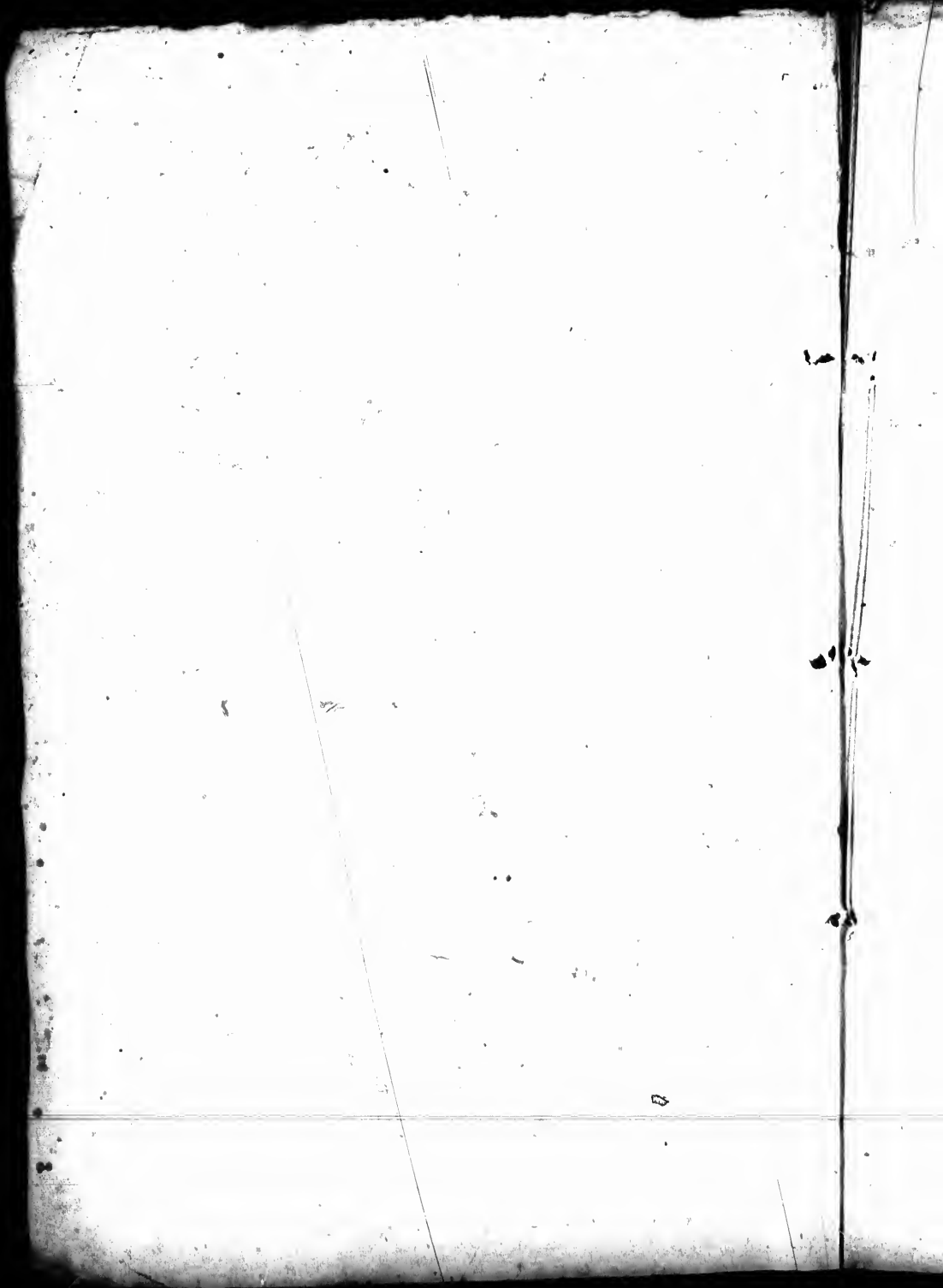
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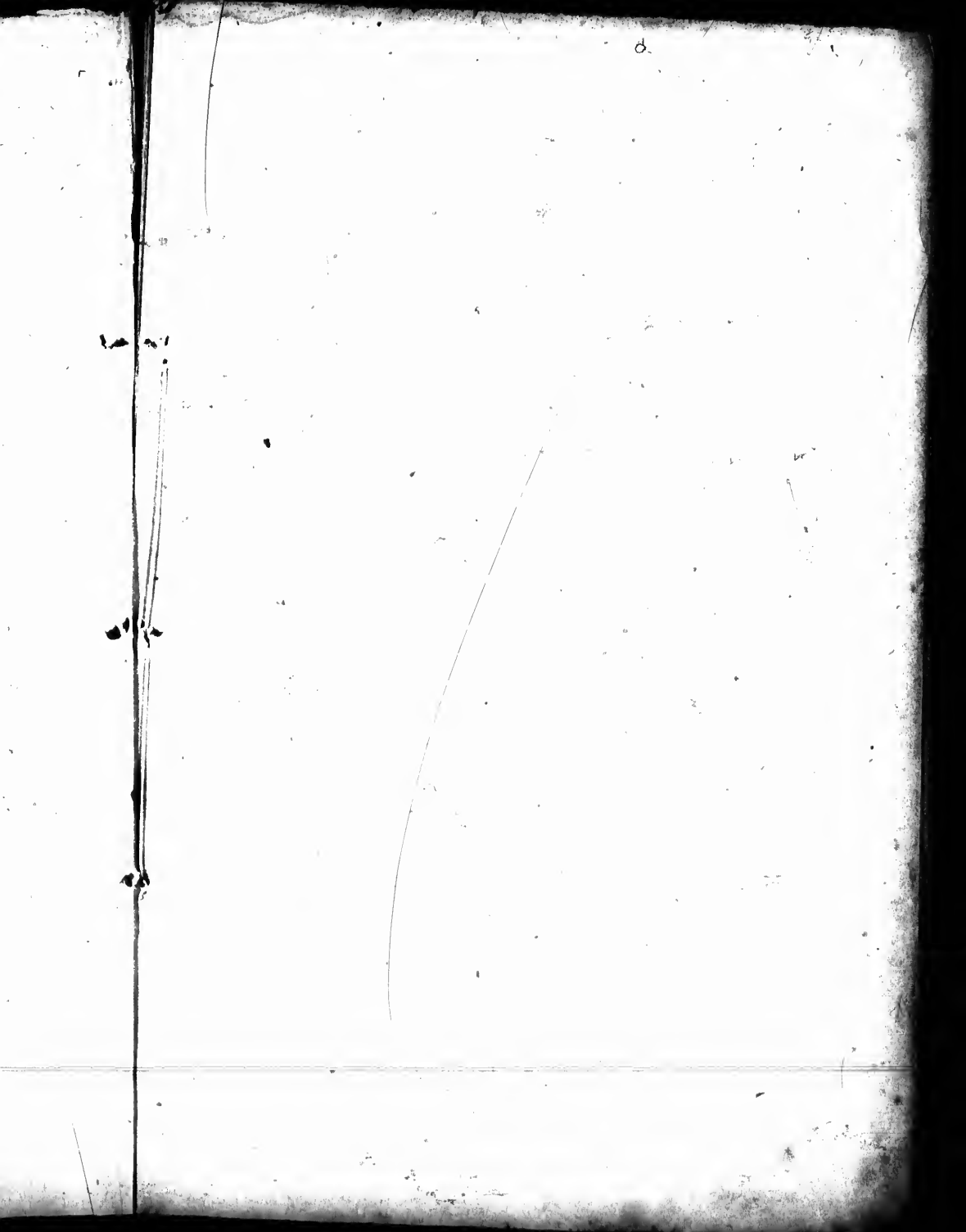
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(FRONTISPIECE.)



Fig. 1. ALDERNEY BULL. (Page 13.)



Fig. 2. ALDERNEY COW.

PRACTICAL HINTS
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1854.

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*To His Excellency, Colonel Sir J. GASPARD LE MARCHANT,
Knight, and Knight Commander of the Orders of
St. Ferdinand, &c., Lieutenant Governor, &c.*

MAY IT PLEASE YOUR EXCELLENCY,—

In the execution of the work with which your Excellency has been pleased to entrust me, I have endeavored, in accordance with my instructions, to select from the latest and best authorities, practical and useful hints on the management and improvement of Live Stock, and on those departments of Agriculture immediately connected with the maintenance and improvement of domestic animals; and to present these hints in the words of the writers, with only so much introductory and explanatory matter as appeared necessary to render them intelligible and applicable to the circumstances of this Province.

A work of this description must necessarily contain much that is already known to farmers who are well read in the modern improvements in their profession, and also much that is too far in advance of the present condition of Agriculture here, to be readily accepted as practicable or useful. On the one hand, to secure the most extensive utility, it is necessary to be very elementary; on the other, justice to the subject requires that in each department the practice in those countries in which it has been most thoroughly studied and most successfully conducted, should be stated in detail. I have endeavored, however, to select chiefly from works not as yet very generally read in this Province, and to confine myself to facts and methods, either directly suited to the existing state of Agriculture here, or capable of affording practical suggestions to any intelligent reader.

It is to be regretted that the agricultural literature of Nova Scotia does not afford more extensive collections of the best practice of our own farmers. I trust that this deficiency may be remedied, by the method suggested near the close of this work; and that by requiring statements from all persons who may receive premiums at agricultural exhibitions, the legislature may be enabled to elevate the condition of Agriculture, and to make a knowledge of the practice of the most successful cultivators the common property of all.

Trusting that your Excellency's enlightened efforts for the improvement of Provincial Agriculture, may be crowned with complete success, and that this compilation may tend in some degree to that end,

I have the honor to be,
Your Excellency's humble servant,
J. W. DAWSON.

February 14, 1854.

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NOTE.—We are indebted to Mr. C. M. Saxton, Agricultural publisher, New York, for the figures of cattle contained in this work, which are from casts of the wood-cuts in his American edition of "Youatt and Martin, on Cattle."

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I.—REARING AND MANAGEMENT OF NEAT CATTLE.

The matter under this head is almost entirely selected from Youatt's *Grazier**, with some condensation and explanation, where these appeared necessary.

1. Breeds of Domestic Cattle.

This being a most important point in the improvement of Stock, the following summary of the characters of the several breeds, as ascertained in England, should form a part of the practical knowledge of every Farmer.

The DEVONSHIRE BREED is found in its purest state in North Devon. Its qualities are thus described by Mr. Vancouver, in his Agricultural report on that district.

"Head small, clear and free from flesh about the jaws; deer-like, light and airy in its countenance; neck long and thin; throat free from jowl and dewlap; nose and round its eyes of a dark orange colour; ears thin and pointed, tinged on the inside with the same color that is always found to encircle its eyes; horns thin and fine to their roots, of a cream color tipped with black, growing with a regular curve upwards, and rather springing from each other; light in the withers, resting on a shoulder a little retiring and spreading, and so rounded below as to sink all appearance of its pinion in the body of the animal; open bosom, with a deep chest or keel; small and tapering below the knee, fine at and above the joint; and where the arm begins to increase, it becomes suddenly lost in the shoulder; line of the back straight from the withers to the rump, lying completely on a level with the pin or huckles, which lie wide and open; the hind quarters seated high with flesh, leaving a fine hair-ham tapering from the hock to the fetlock; long from rump to huckle, and from the pinion of the shoulder to the end of the nose; thin loose skin covered with hair of a soft or furry nature, inclined to curl whenever the animal is in good condition and in full coat, when it also becomes mottled with darker shades of its permanent color, which is a bright red without white or other spots, particularly in the male. A white udder is sometimes passed over, but seldom without objection."

This fine looking breed of Cattle has however some defects in external form, as—

"The sudden retiring of the vamp from behind the huckle to a narrow point backwards; the great space between the huckle and the first rib; a flat-sided appearance, and an awkward cavity between the keel and navel."

“The North Devon cattle are highly esteemed both for feeding and draught, but are not so much valued for the dairy; yet their milk, though deficient in quantity, is of such excellent quality, that as much butter can be made from that yielded by a North Devon cow, as from that yielded by the breeds which are esteemed better milkers. For all the purposes of labour, whether for activity, docility, strength or hardness, this breed cannot be excelled, and the quality of the meat is unrivalled by that of any other breed.”

The North Devon breed merits the attention of farmers in this country, whose object is to rear cattle for draught or for fattening.

The SUSSEX BREED—differs from the Devonshire by being larger and coarser. When pure, they are invariably of a dark red colour. They are thus described by an eminent breeder, (Mr. Ellman.) “Head thin; jaws clean; horns long, pointing forward and upward; eye full, throat clear and no dewlap; neck long and thin; shoulders wide and deep; barrel round and straight; space between hip bone and first rib very small.”

“The true Sussex Cattle are large hardy animals. They are prized for their labouring powers, more than for anything else. Few of the Cows are good milkers, nor do the oxen fatten at an early age.

The HEREFORD BREED is a variety of the Devon and Sussex, but is larger and weightier than either. The prevailing colour is reddish brown, and the face white or mottled. The hair fine and inclined to curl, and the skin soft and elastic.

“In the true bred Hereford cattle, there is no projecting bone in the point of the shoulder, but it regularly tapers off. They have a considerable breadth before, and are equally weighty in their hind quarters. There is a great distance from the point of the rump to the hip bone; the twist is full, broad and soft; the arm as far as the pastern joint, tapering and full, but thin and tapering below the joint. The animal handles remarkably well, and is especially mellow on the rump, ribs and hip. The quality of the meat is not hard, but fine as well as fat. There is little coarse flesh about them, the offal and bone being small in proportion to their weight; while their disposition to fatten is equal if not superior to that of any other breed in the island; they are not however calculated for the dairy. They arrive early at maturity, and there is a great disproportion in size between the cows and the oxen.”

The Herefords are considered to be unrivalled for fattening stock, and might be very profitable on the marsh lands and richer grazing farms of this Province. It is very questionable if they would thrive on our ordinary upland farms.

The SHORT HORNED DURHAM or YORKSHIRE CATTLE—are a mixed breed having several varieties, the best of which is that of the “improved short horns” or proper Durhams. “This breed was introduced about sixty years ago, by Messieurs Collings of Darlington, and has rapidly risen in public estimation. They are of good size, beautifully mottled with red spots upon a white ground; their backs are level; the throat

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clear; the neck fine but not too thin, especially toward the shoulder;
the carcass full and round; the quarters long and the hips and rump
even and wide. They must not stand too high on their legs; they
handle very kindly, are light in their bone in proportion to their size,
and have a very fine coat and mellow hide. They possess the valuable
property of fattening kindly at an early age; indeed the feeding pro-
pensities of the Durhams are unequalled; but they are not good milkers
and are rarely used for agricultural purposes."

"There is a variety of the Durham breed, known as the *Yorkshire*
polled cattle. They are without horns, and are in considerable estima-
tion among the London cow-keepers, as being capital milkers, and at
the same time maintaining their flesh in a state nearly fit for the
shambles." To enable them to do this, however, very high feeding
must be necessary.

The Durham Cattle, as well as many crosses of them with other
breeds, are now pretty well known in this Province, and much esteemed
for fattening cattle; though their deficiency in milk is a great drawback
to their general introduction. The following remarks of Prof. Johnston
in his Report on New Brunswick, are worthy of attention.

"For early maturity and a speedy manufacture of beef for the
butcher, my own experience has lain chiefly among the short-horns, and
I am inclined to recommend this breed. At the same time, where the
production of human food only is concerned, the *milk-yielding* is
much more valuable and productive than the *beef-making* quality. A
good cow will give from the same quantity of vegetable food a much
larger amount of food for man, in the form of milk, than a fat beast in
the form of beef, however early he may arrive at maturity. In respect
to this quality the Ayrshire generally exceeds the short-horn, so that
where milk is wanted, experience is in favor of the former breed. For
profitable use among small farmers, therefore, and as a manufacturer of
food for his family, the Ayrshire is the more sure; for the beef raiser
and rich manure maker, the short-horn is the more generally useful.
It is at the same time true, that some strains of blood in either breed
combine both of these qualities or kinds of fitness in the same animal."

Though the Durham short-horns are by no means celebrated as milk-
producers, there is an allied *Yorkshire Breed* which produces some of
the finest milkers in existence: Milburn thus describes the finest kinds.
"The Yorkshire cow is of much larger size than most other milch cows,
and when fat will weigh from sixty to eighty stone. Her head is fine
and somewhat small; there is a serene placidity of eye which shows
a mild and gentle disposition, tending alike to produce fat and milk.
The horns are small and white, the muzzle without black spots; the
breast deep and prominent, but that and the shoulders thin; the neck
somewhat narrow, but full below the shoulders and without loose skin;
the barrel somewhat round; the belly capacious, the milk-vein large,
back perfectly straight, rump wide and flat, tail small, and set on so
that there is almost a straight line from the tail to the head. The pre-

walling colour is roan or red and white, and sometimes white, with the tips of the ears red. The thighs are thin; but the legs are straight and rather short. The udder is very large and muscular, projecting forward, well filled up behind, and so broad as to give the cow the appearance of a waddle in her walking."

Milburn states that these cows have been known to give thirty quarts of milk per day, and as much as fifteen pounds of butter per week. These cows are much valued for the London dairies, and are there fed in such a manner as to produce the largest quantity of milk without regard to quality. "Mr. Laycock in his London dairy, which is supplied by Yorkshire cows, retains no cow which does not yield two gallons of milk per day, and the average of his dairy is as much as nine quarts daily." These cows are also said to fatten well, and may therefore be considered as in all points a very profitable breed.

The LONG HORNED CATTLE.—"The finest of these, known as the *Dishley Breed*, have long and fine horns, small heads, clean throats, straight broad backs, wide quarters and are particularly light in their belly and offal. They give less milk than some other breeds, and are chiefly valuable from their aptitude to fatten early, on the most valuable points, and the superior quality of their flesh. They are hardy and capable of thriving on ordinary pastures; and are said to keep in good condition on less food than other cattle of equal weight. This breed is however rapidly giving place to the short-horns, in every part of England."

The GALLOWAY BREED or POLLED SCOTS—are well known in some parts of this Province, as are cross breeds between them and other varieties. Mr. Mure thus describes the pure breed:—

"Back straight and broad and nearly level; barrel round; loins broad; hock bones not projecting. In these respects they will compare favorably with any breed. Quarters and ribs long; chest deep but not broad in the twist. The space between the hip bone and the ribs is less than in most other breeds—a consideration of much importance, for the advantage of length of carcase consists in the animal being well ribbed home, or as little space as possible lost in the flank. Leg short and moderately fine in the shank bones; with a hardiness and disposition to fatten. No breed is so large and muscular above the knee, with room for a deep and capacious chest. The neck is thick almost to a fault."

"The Galloways are a hardy race, subsisting on the coarsest pasture, and increasing rapidly when removed to more favorable situations. They fatten kindly; their flesh is of the first quality; and the joints being of moderate size are more suitable for consumption in private families, than those of the larger breeds." These qualities well fit them for many parts of this Province; but it must be observed that crosses between the Galloway and other breeds, have rarely been found advantageous; and hence where this breed is adopted, it is necessary to adhere to it alone. One cross breed however, that with the Durham bull, has been very advantageous; and the polled SUFFOLK, a variety or cross of the Galloway, is celebrated for its milking qualities.

times white, with the legs are straight muscular, projecting to give the cow the

to give thirty quarts of butter per week. These are fed quantity of milk without dairy, which is supposed not yield two gallons is as much as nine well, and may therefore be bred.

These, known as the heads, clean throats, especially light in their other breeds, and are on the most valuable. They are hardy and said to keep in good light. This breed is every part of En-

well known in some them and other vari-

barrel round; loins as they will compare; chest deep but not and the ribs is less importance, for the al being well ribbed k. Leg short and ss and disposition to the knee, with room almost to a fault." the coarsest pasture, favorable situations. y; and the joints umption in private alities well fit them served that crosses been found advan- is necessary to ad- the Durham bull, k, a variety or cross ies.

The HIGHLAND BREED includes two varieties, the *West* and *North* Highlanders. The former are the larger and finer, and are found in great perfection in Argyleshire.

"The horns are large, sharp pointed and up-turned; and the color generally black, though sometimes brindled and dun. The hides are thick, and covered with long soft hair of a close pile. In other respects they are not unlike the Galloway breed, many of whose best qualities they possess, and particularly their hardness of constitution, beautiful symmetry and finely flavored flesh. Their straight and level backs, their round and deep carcasses, and the quantity of good meat which they yield in proportion to their size, are most valuable points."

The AYRSHIRE BREED — is deservedly celebrated for its milking qualities; and has been found by experience to thrive in this Province, and to form good crosses with other breeds previously in the country. The characters of the pure breed are thus given by Mr. Aiton:—

"Head small, but rather long and narrow at the muzzle; the eye small but quick and lively; the horns small, clear, bent, and the roots distant from each other; neck long and slender, and tapering towards the head, with little loose skin below; shoulders thin; fore quarters light and thin; hind quarters large and capacious; back straight, broad behind and the joints and chine rather loose and open; carcass deep, and the pelvis capacious and wide over the hips, with fleshy buttocks; tails long and small; legs small and short; joints firm; udder capacious, broad and square, stretching forwards and not fleshy, low-hung nor loose; milk-veins large and prominent; teats short, pointing outward and distant from each other; skin thin and loose; hair soft and woolly; head, horns and other parts of least value small; and the general figure compact and well proportioned."

The ALDERNEY BREED — which is peculiar to the Island of that name, and the neighboring Islands of Jersey and Guernsey, is believed to have entered largely into the old stock of this Province; and it has recently been again introduced in a state of purity, by the bounty of His Excellency Sir J. Gaspard LeMarchant. These cattle are thus described by Youatt.

"The cows are small, but the oxen frequently attain a bulk and stature quite disproportionate to that of the female. Their colour is either light red, dun or cream, mottled with white; the horns are short, gracefully curled, and the bone fine. They are chiefly valued for the dairy, not on account of the quantity of milk which they yield, but the richness of that milk, and the proportionate quantity of butter that can be obtained from it; but they are not good feeders and seldom make much flesh. The best milch cows are observed to have a yellowish circle round the eye, with the skin at the extremity of the tail of a deep yellow color, approaching to orange."

"Although the breeds throughout the Norman Islands are nearly similar, yet the cattle of Jersey are said to be better than those of Guernsey. They are certainly smaller and more delicate; and so

anxious are the inhabitants to preserve them in their native purity, that there is an Act of their Legislature which prohibits the importation of all foreign neat cattle, even from the neighboring Islands, under severe penalties of fine and confiscation, including the destruction of the animal itself, which in such cases is slaughtered and distributed among the poor. When exported, the same Act directs that they shall be accompanied by a certificate of their being natives of the Island; but it is not easy to procure those of best quality. As fattening cattle, the produce of these Islands have few good points: but their flesh is finely grained, highly coloured and of excellent quality. The cows are rich milkers, and both on that account and because of a certain neatness in their appearance, they command high prices. There is a prevalent notion that they will thrive on any kind of land, and they are consequently kept on bare paddocks, with the assistance of hay in winter. Like all light cattle, they certainly do not require the same support as larger animals, but their native pasture on the Island is of the richest kind; and it is partly owing to the less nutritive herbage, on which they are frequently fed in England, that the quantity of their milk becomes not equal to its quality. In Jersey they are partly fed on parsnips, which are found to improve the quantity and quality of the milk."

Comparative Merits of Breeds.

On this subject I may observe that experience in this Province and the neighboring colonies and states, in so far as I am acquainted with it, indicates; that for fattening stock on marsh or rich upland farms, the Durham short-horn takes precedence of the other imported breeds. The Herefords have also been tried, but not with the same success. The Devon has, in this country as in England, proved excellent for draught, but inferior to the Durham for early fattening. For dairy purposes the Ayrshire and Alderney must take the highest place.

The Galloway and Highland cattle are not now to be found here in a state of purity, and there can be little doubt that the introduction of good specimens of these cattle, as fattening stock for upland farms, would be very useful. As dairy cattle, the Yorkshire variety of the short-horns, and the Suffolk polled, appear to deserve a trial.

Many individuals of the mixed breeds which prevail in this Province, and have long been naturalized in it; are of excellent quality; and by attention to the points and treatment mentioned under subsequent heads, and by judicious crossing with the imported breeds, herds may be secured equal to those of any country, and well adapted to our climate. Our native cattle have suffered much from want of care in selecting the best animals to breed from, insufficient food when young, and bad winter keep; but many of them still possess some of the most important characters of good animals, and will show them under good treatment; while on the other hand, with careless management, the best foreign breeds will become unprofitable and degenerate.

The following facts relating to the comparative weights and produce of different breeds in Great Britain, are given as data for comparison with the results obtained in this Province.

Fattening Properties.

"The Durham Ox (of the short-horned breed), a son of Charles Colling's Favorite, weighed 187 stone 2 lbs. The Yorkshire Ox, bred by Mr. Dunhill of Newton, near Doncaster, weighed when killed 264 stones 13 lbs. These are weights of 14 lbs. to the stone, and shew the capabilities to accumulate fat and flesh possessed by this extraordinary race of animals." (Milburn.)

"At about three years old, the Durham short-horns often weigh from 80 to 100 stones. The celebrated "Durham Ox" of Mr. Colling (already mentioned,) weighed when alive, at ten years old, 270 stones; and after a two months illness, occasioned by dislocation of his hip-bone, he weighed as follows:—

	Stone.	Lbs.
Four quarters	165	12
Tallow	11	12
Hide	10	2
	187	6

(Youatt.)

"The relative estimation of the flesh of the principal breeds at Smithfield market, and the average differences of price for the best qualities of each in January, 1853, were as follows:—

Scotch Oxen,	4s. 8d. per stone of 8lbs. to sink the offal.
Leicester, Hereford, and fine short-horns,	{ 4s. 6d. to 5s. do. do.
Coarse inferior beasts,	{ 3s. 6d. do. do.

(Youatt.)

"A bullock of the *Galloway* breed, well fattened will weigh, from 40 to 60 stones at 3 to 3½ years of age; and some have been fed to more than 100 stones imperial weight, at five years old."—(Youatt.)

"The *West Highlanders* will weigh, with amazingly little care, from 48 to 50 stones; and some have been said to reach as high as 70. The "Doddies" or polled cattle of Aberdeenshire, will weigh from 70 to 80 stones; and will even reach as far as 100 stones when five or six years of age. The tendency of the flesh in all the hardy Scottish cattle is to form on the back."—(Milburn.)

"The *Suffolk* polled cattle, though as already stated, good milkers, fatten with rapidity. The cow is easily fattened to forty or five and forty stones (500 to 600 lbs.) and the quality of her meat is excellent. These *Suffolk* cattle are believed to have sprung from the *Galloway*."—(Youatt.)

The following are experiments made between Devons and West Highlanders and Galloways.

"Twenty Devons and twenty Scots were bought in October, 1822, and wintered."

"Ten of each sort were fed in a warm straw-yard upon straw alone, but with liberty to run out upon the moor."

"Ten were fed in a meadow, having hay twice every day until Christmas."

"They afterwards lay in the farm-yard, and had oat straw and hay, cut together into chaff. They were then grazed in different fields, equal proportions of each sort being put into the same field."

"Those that lay in the warm straw-yard with straw only, were ready as soon as the others, although the others had an allowance of hay during the winter."

"Sixteen of each were sold at different times; March 24th, 1824, being the best sale. The Scots were ready first and disposed of before the Devons."

The Scots cost £7 12s. 10d. each, or £122 5s 4d.

They sold for £235 18s. 6d., gain by grazing.

£118 13 2

The Devons cost £7 6s. 6d. each, amounting to £117 4s., and sold for £250. Deducting £18

14s. 6d. for the longer time in feeding, there remains

£231 5s. 6d.—gain,

£114 1 6

Balance in favor of the Devons.

0 8 4

"The remaining four of each breed were kept and stall-fed on turnips and hay. The Scots sold at £75, and the Devons at £84; the account of which will be as follows:—

4 Devons, cost £29 6s. sold for £84—gain

£54 14 0

4 Scots, cost £30 11s. 4d. sold for £75—gain

£44 8 8

Balance in favor of Devons.

10 5 4

(Youatt.)

Milking Properties.

"The *Long Horned* or *Dishley* stock are now chiefly valuable as dairy cattle, and principally for cheese-making; and some cows will furnish from 400 to 500 lbs. of cheese each in the season." (Youatt.)

"The *Suffolk Duns* are said in the London dairies to give as much as 8 gallons of milk a-day, after calving, and six during a great part of the season." (Ib.)

"In the *Epping* district, where no particular attention is paid to the selection of stock, and where there is an indiscriminate mixture of Devons, Suffolks, Leicesters, Holderness, and Scotch, the calculation in a well managed dairy, amounts to 212 lbs. of butter, viz:—

6 lbs. per week during 26 weeks,

156 lbs.

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(Youatt.)

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"Mr. Aiton's calculation is as we have already seen, 250 lbs. per annum, for the Ayrshire breed."—(Ib.)

"It has been calculated that the herbage that will add 112 lbs. to the weight of an Ox, will enable a dairy cow to yield 450 gallons of milk, which will give in butter and cheese a greater return than that afforded by the meat."—(Ib.)

"The *Highland Cow* will not yield more than a third part of the milk that is obtained from the Ayrshire; but the milk is exceedingly rich, and the butter procured from it is excellent."—(Ib.)

"Five gallons daily for two or three months after calving, may be considered as no unusual average for an *Ayrshire Cow*. Three gallons daily will be given for the next three months, and one gallon and a half during the succeeding four months. This would amount to 850 gallons per year, but allowing for some unproductive cows, 600 per annum may be a fair average. This milk may be estimated to yield 257 lbs. of butter or 514 lbs. of sweet milk cheese per annum."—(Ib.)

"The *Galloways* are not considered good milkers, but their milk is rich in butter. A cow that gives 12 or 16 quarts per day is considered very superior; and that quantity produces more than a pound and a half of butter. The average, however, of a *Galloway* cow, cannot be reckoned at more than 6 or 8 quarts per day, during the fine summer months after feeding her calf. During the next four months, she does not give more than half of that quantity, and for two or three months she is dry."—(Ib.)

"The following observations were made by Mr. Calver of Brampton on the quantity of butter yielded by one of his Short-horns. The milk was kept and churned separately from that of the other stock, and the following is the number of pounds of butter obtained in each week—7, 10, 10, 12, 17, 13, 13, 13, 15, 16, 15, 12, 13, 13, 14, 14, 13, 12, 12, 13, 11, 12, 10, 10, 8, 10, 9, 10, 7, 7, 7. There were churned 373 lbs. of butter in the space of 32 weeks. The cow gave 28 quarts of milk per day, about Midsummer, and would average about 20 quarts per day for 20 weeks. She gave more milk when pastured in the summer, than when soiled in the house in consequence of the very hot weather. She was lame six weeks from foul in the foot, which lessened the quantity of milk."—(Ib.)

The produce of the *Alderneys* is thus noticed by Milburn:—

"The produce of these small animals both in milk and butter is very great, and may be taken in fair specimens at twenty quarts of milk daily and ten pounds of butter in the week, during the months of April, May, June, July, and August. Instances are recorded of cows giving 26 quarts of milk in twenty-four hours, and yielding as much as fourteen pounds of butter per week! Fourteen quarts of the milk being capable of producing a pound of butter, the same quantity would give a pound and a half of cheese; and the whey or drainings of twenty pounds of this cheese would produce four pounds of butter, somewhat inferior for toast, but quite adequate to the making of pastry."

2. Choice and Purchase of Cattle.

The above description of the several breeds will be useful in this respect; but there are a number of subordinate points well deserving of attention, and which can be reduced to the form of rules. The following are copied almost verbatim from Youatt.

The first object of attention is to consider the proportion between his stock and the quantity of food that will be necessary to support it. The nature, situation, and fertility of the soils that compose his farm are equally worthy of notice, as well as the purpose for which he designs more particularly to rear or feed his cattle: and chiefly, whether for the dairy or with the view of supplying the markets. It will be expedient to observe the greatest exactness in these proportions; because, in case he should overstock his land, he will be compelled to re-sell before the cattle are in a fit state for market, and, consequently at certain loss; while on the other hand, he will incur a diminution of his profit if he should not stock his land with as many cattle as it will bear."

"He should next endeavor to procure thoroughly good male animals; and extra ten or twenty pounds is always well bestowed thus; and he should decide on the breed or breeds he intends to keep; by purchasing and breeding from various different breeds indiscriminately, he will never have a good animal, and eventually his herd will be mongrels. Neither must he pursue the *in and in* system to any extent, or he will find his stock deteriorate rapidly."

As points deserving of careful consideration in the purchase of cattle, especially those intended for fattening, the following are enumerated:--

- (1.) *Beauty* or symmetry of shape.
- (2.) *Utility of form*.—The head should be fine and small, tapering toward the mouth. Few good milkers or feeders are without this fineness of muzzle. The neck should also be fine, but may thicken rapidly toward the shoulder. The chest should be deep and broad, and the back broad and level, and the animal ribbed almost home. The loins should be wide at the hips but not prominent; the thighs full, long and near together; and the legs short. The bones of the legs should be small, the hide mellow but not loose—everywhere covered with hair soft and fine but not effeminately so.
- (3.) *The Flesh*—of course varies with age and food. It should however be marbled or intermixed with fat and lean; and when alive, should feel firm and mellow or elastic, and not hard or flabby.
- (4.) *Cattle from richer or better ground* should not be purchased for poor or medium farms. The farmer should select such animals as have been found to suit the soil or keep he has for them. This last should however be improved if possible.
- (5.) *Docility of disposition* is an object of great moment. Independently of its other advantages, tame beasts require less food to rear, support and fatten them. Gentle, kindly, equable treatment will most effectually conduce to this end; and stock so treated are more valuable than those that have had their tempers spoiled by bad treatment.

(6.) *Hardness of constitution*, is a matter of some importance. Cattle with arched ribs and wide chests and backs, are more likely to prove hardy than those that have their fore-quarters narrow.

(7.) *Early maturity* is also valuable, but it can only be maintained by feeding young cattle in such a manner as to keep them constantly in a growing state. A good breed well fed in winter, will thrive more in three years than in five with insufficient food in winter. It seems to be a generally received opinion that small cattle have a stronger disposition to fatten than the larger breeds, and will produce more meat per acre.

(8.) *The Age of Cattle* may be estimated by the teeth and horns: "Neat cattle cast no teeth until they are turned two years old, when they get two new teeth. At three they get two more; and in every succeeding year two more, until five years old, when they are called full-mouthed; though the two corner teeth which are last in renewal, are not fully up until they are six."

When two years old, the horns are without wrinkle at the base, but at three years old a circle or wrinkle appears, to which another is added every year, so that by adding two to the number of rings the age may be ascertained, unless the rings have been scraped or filed away. These circles must not be confounded with other ringlets sometimes found at the base of the horns, and which are a tolerably sure indication that the animal has been ill-fed during its growth; another frequent consequence of which is that the horns are crooked and unsightly. There is also a tip at the extremity of the horn, which falls off about the third year."

3. *Breeding of Cattle.*

On this subject Youatt gives the following hints:—

"*The Bull* generally attains the age of puberty at twelve or fourteen months, and may be used moderately at that age without injury. Young bulls that have been suckled on the cow in a pasture, will generally serve cows more readily at an early age than those reared in the house. It is not advisable to put old or heavy bulls on young heifers. Neither is it well to allow the bull to run in the pastures with the cows, and especially is this practice injurious to young bulls, often spoiling their tempers, besides doing them other harm. Wherever the situation can be by any means made to admit of its being avoided, this should never be permitted. As it is desirable at times for the bull to have exercise, he should be allowed to have a loose box when young, and should be regularly-rubbed down every day, and as he gets older led out occasionally. The temper of the animal much depends on the treatment he receives, nevertheless some bulls are naturally far more vicious than others."

"Although *the Cow* may be supposed to arrive at puberty at the end of eighteen months or even earlier, it is not generally advisable to put her to the bull before the age of twenty-two months or two years. Much however depends on the breed, the treatment and the constitution

of the heifer. Some breeders hold that cows may be sent to the bull as early as one year old, but this is injurious either to the mother or offspring and is generally considered injudicious. Some cautious breeders on the other hand defer it for three years or even longer."

"The most judicious method of breeding is to employ males of superior shape, but yet of suitable size, and to couple them with females nearly as large if not larger. The nearer the other qualities of both approach to perfection, the better will it be for their progeny, but it is material that even in their best points there should not be too great disparity. *Gradual improvements* will always be followed by certain ultimate success, while violent attempts to effect a *sudden change*, will invariably disappoint expectation."

"The period of time during which cows are allowed to *run dry* previously to calving, is by no means settled. By some graziers they are recommended to be laid dry when they are about five or six months gone with calf; but repeated and successful experiments prove that six weeks or two months are sufficient for the purpose: indeed cows kept in good condition, are sometimes milked until within a fortnight of calving, this however, is a practice not to be recommended; for if a cow *springs* before she is dry, serious injury may ensue.

"As cows are very subject to *Abortion* when improperly treated during gestation, they ought to be watched with more than ordinary care during the whole of that period, and particularly the latter portion of it. The principal causes of abortion are violence or accidents, too good or too poor condition, hereditary predisposition, some epidemic or atmospheric influence, and lastly contagion or a tendency to slip the calf being propagated from one cow to another, from the irritable imagination of the beast. It is therefore a matter of prudence or almost of necessity to separate the cow that has slipped her calf from the rest of the herd, and it should not be forgotten that cows that have once slipped their calves are more liable than others to a recurrence of miscarriage. For about a month or six weeks before the time of calving it will be advisable to turn the cow to grass, if in the spring; but if in the winter, she should be fed with the best hay and some turnips, potatoes, carrots, or other winter fodder, or a mixture of bran, peas or bean meal. Should these not be at hand, the mere boiling of a portion of the hay, and giving it with the water, when cool, will be found to keep her body in a healthy state for calving, and also improve her milk. It is not desirable that she should be fattened, because the fatter a cow is the less milk she gives; and yet if she is too poor, there is danger that she should drop in calving."

In some circumstances, the cow should in calving be left to nature; but if any accident happens or is likely, some experienced person or a regular attendant should be called in.

"After the cow has calved, she should be left quietly with her little one; it is cruel and dangerous to separate them. A warm mash should be given, and her water slightly warmed. In fine and dry weather she

should be watched attentively, in case she should require aid, but no artificial means used unless she evidently needs assistance. On the following day she may be turned out about noon, and regularly taken in during the night, and this for three or four successive days."

"After the calf is produced, it will sometimes be necessary to assist the natural functions of the animal in removing the *secundines* or after-birth, provided in the uterus for nourishing the foetus, and which might become putrescent and produce considerable irritation in the womb, and probably fever. There is no danger however that this will immediately take place, and a few days will pass before any material inconvenience will ensue. No attempt should be made hastily to remove it, unless there is evident inconvenience or danger from its retention. Cows will often eat this substance with avidity, and this is never known to be prejudicial to the health of the cow, but on the contrary it is believed to act as a medicine."

"It may be necessary to milk the cows three or four times a day, for two or three days, especially if they are full of flesh and the udder hard. The calf should be suffered to suck as frequently, if in the house; or if in the field to run with the mother and suck at pleasure; it being carefully observed that she does not prevent it from sucking, for if the udder or teats are sore she will probably drive it away, and danger of losing both animals may be incurred. Should the udder or teats become hard, knotty or tender, the most easy and effectual remedy will be to let the calf derive all its nourishment from sucking."

4. Management of Calves.

The selections under this head, relate chiefly to the rearing of young calves, and to fattening them for the market.

"After the calf is produced, the cow should be allowed to cleanse it by licking. It is a very bad practice to give the calf gruel soon after its birth; the *beestings*, or first milk drawn from the cow, will be the best thing that can be administered to it. It is seemingly provided by nature as the first aliment of the young animal, and is both nourishing and medicinal."

"There are two modes of feeding calves: one is, to permit them to run about with their mother during their first year, the other is to wean them when a fortnight old, and bring them up by hand. The former method eventually produces the best cattle, and is adopted in those districts where fodder is abundant and cheap."

"Whether calves are intended to be raised for breeding, labour, or fattening, they should have a sufficient supply of good food; for if the supply of it is scanty at first, the animal will rarely if ever attain a considerable growth."

The time of weaning and early treatment of calves, vary much in different localities. The following are selected as examples of the best modes:—

"In several counties of England the calves are left with the cow for about ten days or a fortnight; and being taken from her, are taught to drink first new milk for a week or two, then new and skimmed milk mixed; and if after a month or so the calf seems thriving, skimmed milk only is given, with oat or barley-meal or crushed linseed, at first in small quantities and gradually increased in proportion to his age and growth. Small wisps of fine hay are then placed within their reach, which they begin by sucking and gradually become induced to eat. Turnips chopped small, or carrots and good sweet hay may then be given to them, and when they eat well, linseed cake or oat cake are added. They should be liberally kept for the first six or eight months, and well housed and kept warm and clean.

"About three quarts of new milk daily are sufficient for the support of a young calf. It should be given regularly at stated hours, and he should be kept as quiet as possible, for rest will materially improve his growth."

"In Ayrshire, calves intended to be reared for dairy cows, are fed for four, five, or six weeks, and allowed four or five quarts of new milk at each meal. Some farmers give no food but milk until they begin to eat grass, &c., which is generally about the fifth week. The milk is wholly withdrawn about the end of the seventh or eighth week. If reared in winter, the milk is continued longer. Others feed with meal after the third or fourth week, or gradually introduce some new whey with the meal, and afterwards withdraw the milk. Hay tea, linseed jelly, oat and wheat meal porridge, treacle, &c., are sometimes used with advantage, but milk when it can be spared is by far the best, as it is the most natural food."

"Even young cows," says Aiton, in treating of the Ayrshire dairy husbandry, "intended for the dairy, should be fed from the time they are calves on food suitable for milch cows, and treated nearly as their dams. Such food and treatment have the greatest tendency to form the milk vessels of the young cows, and rear them with dairy qualities. It is by such treatment that a calf is formed into a dairy cow, and those who wish to rear and keep a dairy breed in anything like perfection, must provide them with an abundance of such food as is suited to the production of milk, when they are young, when they are full grown, when they are in milk, and when they are *yell*."

There can be little doubt that the Ayrshire breed owes much of its excellence to the practice of this rule, and it will be found impossible to rear first-rate animals if they are starved when young.

"In Devonshire, the calves are permitted to suck as much as they like, three times a day, during the first week or ten days; after which they are suckled by hand, and fed with warm new milk for three weeks longer. They are then fed for two months, twice a-day, with as much warm skim milk as they can drink, in which some feeders mix a small portion of finely powdered linseed-cake or meal. After this the meals of milk are gradually abated, and at the end of four months the calves

are wholly weaned, and fed on hay, chopped roots, oatmeal, &c., until they go to pasture."

The following American methods are more economical, though probably not so well calculated for rearing superior animals.

"Mr. Budd of Boston, pursues the following mode:—take the calves when three days old, from the cows, and put them into a stable by themselves; feed them with gruel, composed of one-third barley, two-thirds oats, ground together very fine and sifted. Each calf is to receive a quart of gruel morning and evening, which is to be made in the following manner:—to one quart of the flour add twelve of water, boil half an hour and let it stand till milk warm. In ten days tie up a bundle of soft hay in the middle of the stable, which they will eat by degrees. A little of the flour put into a small trough for them to lick occasionally, is of service. Feed them thus till they are two or three months old, increasing the quantity. Three bushels of the above mixture will raise six calves."

"Mr. Cleft of New York, takes the calf from the cow at two or three days old; he then milks her, and while the milk is warm teaches the animal to drink by holding its head into the pail. If the calf will not drink, he puts his hand into the milk and a finger into the mouth, until the young one learns to drink without the finger. After feeding with new milk for a fortnight, the cream is taken from the milk, and with the latter an equal or larger portion of thin flax-seed jelly is mixed, and the whole given milk-warm. Thus, as the spring is the most advantageous season for making butter, he is enabled during the six or seven weeks that the animals are kept previously to weaning, to make as much butter as they are worth." This is a good method, as the oil of the linseed serves instead of the cream of the milk.

"The successful rearing of calves," says Youatt, "very much depends on the *regularity* and *frequency* of feeding them. The common practice is to supply them with food twice in the day, viz.: in the morning and at evening, when they generally receive as large a quantity as will satisfy their craving appetite. Hence the digestive organs are necessarily impaired, and too many animals either become tainted with disease, or perish from the inattention of their keepers; whereas by feeding them thrice or even four times in the day, at equidistant intervals, and allowing them sufficient space for exercise, they will not only be preserved in health, but greatly improved in condition."

"Whatever food is allowed to calves, care should be taken not to change it suddenly. A calf should have attained a certain degree of strength, before it can dispense with the food most natural to its age, or thrive without the aid of milk; this fluid should therefore be allowed as long as possible. Even when that has been withdrawn, and the animal has begun to eat grass, hay or artificial food, the milk or the substitutes that have been employed in lieu of it, should be partly continued until he prefers the pasture. It is a common notion, that provided young stock acquire size, their condition is immaterial; and after the first

winter they are often turned into the roughest pasture, and kept during the following winter on chopped straw, with perhaps a little indifferent hay. This, when they are intended to be sold to the fattening grazier, may be the most profitable mode; and in some situations it may be the only one that can be adopted; but when they are to be reared for the breed, it is absolutely necessary as the only means of bringing them to perfect maturity, and improving every good quality, that they should be kept on good pasture during the summer, and allowed roots with some sound hay in the winter, and green food in the spring. A contrary mode, however apparently economical, is decidedly disadvantageous; for the worst breed will ultimately be improved by good feeding, while the best will degenerate under a system of starvation."

Judge Peters, of Prince Edward Island, gives the following as the result of his experience:—

"Calves should be well fed for three months, and put on good grass; and well fed during the next winter, using every day an allowance of turnips. It is by no means necessary to let them suck, or to give them new milk. The Complete Farmer gives the following directions:

'The method pursued by Mr. Crook, as mentioned in the letters and papers of the Bath and West of England Society, is as follows:—He purchased three sacks of linseed, value two pounds two shillings, which lasted him three years. One quart of seed was boiled in six quarts of water, for ten minutes, to a jelly, which was given to the calves three times a day, mixed with a little hay tea. And he states that his calves thrive much better than those of his neighbors, which were fed with milk. Thus it seems that less than eighteen cents worth of flax seed, with a trifle of hay, is sufficient for one calf'

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

"I have reared several calves with flax seed jelly, and find it an excellent plan. To save the trouble of making hay tea, I caused a small quantity of boiled skim milk to be mixed with the jelly; and when the calf is about six weeks old, add a hand-full of oat or indian meal. By this means, the dairy turns out as much butter as if no calves were rearing. I purchased one bushel of flax seed, and after rearing two calves, had more than a peck left."

The *Fattening of Calves* for the butcher, is a subject of careful attention in Great Britain. Here the chief care seems to be to produce the lowest marketable condition at a cheap rate, only a very low price being calculated on for the veal. The following hints may be useful in enhancing the quality of the article.

Youatt sums up the best conditions for fattening calves as follows:—

"The best way is to keep them in somewhat dark places, in pens, lest they should fatigue themselves by sporting too much in the light; and to feed them on milk, with the addition of bean, pea, or barley meal, during the last few weeks. Cleanliness should be particularly attended to. For this purpose the pens should be elevated to such a height that the urine may pass freely, and litter should be supplied every day, in order that they may lie dry and clean. A large chalk-stone suspended over the pen is useful, as by licking it the acidity of stomach from which calves are apt to suffer is corrected."

To produce the very finest veal, it seems established by experience that the calves should be fed on milk alone; and this in such quantity and quality as to make them fit for the butcher, in from six to seven weeks.

"The district of Strathaven in Scotland, is celebrated for the excellence of its veal. The calves are fed on milk alone, and are fed by hand. At four weeks old the calves receive the entire milk of one cow. At six or seven weeks each calf receives the milk of two cows. The best feeders disapprove of eggs and meal, which they say darken the flesh." At the price procured for the veal in Scotland, the farmers calculate that they receive for the milk used, at the rate of about 2d. per quart. The low prices procurable in this country, will rarely warrant so large an expenditure of milk.

5. *Draught Oxen.*

Under this head, will be found some remarks on the training of working cattle; and facts bearing on two questions much agitated in this country—the best mode of yoking oxen, and the comparative merits of horses and oxen.

"In training the ox, the only method by which success can be attained is patience, mildness, and even caresses; compulsion and ill-treatment will irritate and disgust him. Hence, great assistance will be derived from gently stroking the animal along the back, and patting him; and encouraging him with the voice, and occasionally feeding him with such aliments as are most grateful to his palate. When he has thus become familiar, his horns should be frequently tied, and after a few days, a yoke put upon his neck. After this, he should be fastened to the plough with an old tame ox, of equal size, and employed in light work, which he may be suffered to perform easily and slowly. The youngster will thus be gradually inured to labor. After working in this manner for a certain period, the steer should be yoked with an ox of greater spirit and agility, in order that he may learn to quicken his pace; and by thus frequently changing his companions as occasion may allow, he will in the course of a month or six weeks, be capable of drawing with the best of the stock."

"Another circumstance of essential importance in breaking-in young oxen is, that, when first put to work, whether at plough or in teams for draught, they should not be fatigued or over-heated, until they are

thoroughly trained; therefore it will be advisable to employ them in labour only at short intervals, to indulge them with rest during the noon-day heats, and to feed them with good hay, which in the present case, will be preferable to grass. In fact, while oxen are worked, they must be kept in good condition and spirit."

"The general character of the ox is patience and tractability. If young steers sometimes prove refractory and vicious, it is in most instances the result of defective management, or of bad treatment when first broken for the yoke. When an ox is unruly or stubborn, it will be advisable to keep him until he is hungry; and, when he has fasted long enough, he should be made to feed out of the hand. On his returning to labour he should be tied with a rope. If he at any time becomes refractory, gentle measures should always be attempted, in order to bring him to work readily and quietly."

In working oxen to advantage much depends on the mode of harnessing them, and the question—"whether it is most advantageous to yoke oxen by the head or collar," has occasioned much discussion, and is even yet undetermined. In Britain, they are yoked by the collar, and this mode prevails in our Province. In Spain and Portugal, as well as various other parts of Europe, they are yoked by the head, and draw by a cross beam of wood, which lies across the back of the neck, immediately behind the horns, and is secured by strong straps or ropes passing over the forehead. In the county of Lunenburg, this method is in general use, having been introduced by the German settlers. Comparative trials, which it is not necessary to occupy space by detailing, have been made in England and elsewhere, and the results seem to show that oxen may be trained to do their work about equally well in either mode. My own observation inclines me to believe, that while for heavy loads and slow work, neck draught may be preferable, the head harness is better in other circumstances. It seems natural to the ox, to use his power by the head and neck, by lowering and raising his head he can suit himself to the inclination of the ground, and he appears to move with much greater freedom and ease than when hampered by a neck-yoke. It would appear however that in Britain, the use of proper harness for oxen, as for horses, is now preferred to the ruder method formerly in general use. They are also very commonly shod, which is effected by aid of the *trevis* or by casting them, or by accustoming the animal from his youth to have his feet handled and hammered.

The *comparative merits* of draught oxen and horses, are very variously estimated in different parts of the Province. The advantages of the ox are its smaller cost, its greater steadiness, and its value for fattening. These advantages must always recommend it to new settlers, and for breaking up new land. On the other hand, horses are quicker, an inestimable advantage in our climate; they can be used to advantage for a considerable term of years without changing, or the trouble of breaking in new animals; they suit a greater variety of work; and can perform extra labour in proportion to the extra expense of their keep. For

to employ them in rest during the winter in the present season are worked, they

tractability. If in most instances when first broken will be advisable to keep long enough, he will labour he becomes refractory, to bring him to

mode of harness-antagonous to yoke action, and is even the collar, and this method, as well as the head, and draw of the neck, immediately or ropes passing, this method is in use by settlers. Comparing by detailing, the results seem to show that oxen are generally well in either the head or the neck, while for heavy work, the head harness is the best, to the ox, to raise his head and he appears to be hampered by a collar, the use of the ruder method of shod, which is by accustoming the ox to the harness.

These are very various advantages of the ox for fattening, and for settlers, and for the quicker, an increase to advantage for the trouble of breaking; and can perform their keep. For

these reasons, the improvement of agriculture is accompanied in most counties, by the gradual abandonment of the ox as a labouring animal. On this subject Youatt remarks:—

“Some trials have shown that three oxen, if highly fed, are equal to the work of two horses; but the additional expense thus created of superior keep, destroys the supposed advantage of economical food. It must also be observed, that oxen if worked to the extent of their power, will become of little value to the grazier; for they cannot stand hard work and maintain high condition; and if once reduced, it is afterwards extremely difficult to restore them. Experience has indeed proved that, keeping in view the profitable sale of oxen and working them accordingly, four will be required to perform the labour of two horses.”

Professor Johnston in his Report on New Brunswick, expresses a very similar opinion:

“Of the qualities and prices of yoke oxen I have little experience, and I doubt the profit of using them in what may be called pure farming. For ploughing among stumps and stones, and for hauling timber in the woods, they may be superior to the less patient and quicker horse; but the farmer who owns an extent of cleared and stumped land, and attends only to his farming business, will not find time in the short seasons of New Brunswick to wait on the laggard footsteps of such oxen as I have seen at work in the Province. I have been told in the State of New York that oxen are to be had with a step nearly as quick as that of ordinary farm horses, and which will do nearly as much work. But such cattle, to do the work, require to be fed nearly as well as the horse, so that the alleged economy in feeding oxen, in comparison with horses, in this case disappears; and the advantage of feeding them into bad beef at the end of eight or nine years, and selling them for six or eight pounds to the butcher, is nearly all that remains to compensate for the loss of time which, with the best of them, the farmer must always experience. Where wages are complained of as being high, a very small amount of this time will exceed in value the price obtained, after a series of years, for the worn out ox.”

6. *Feeding and Fattening of Cattle.*

This subject may be divided into the three departments of grazing, soiling and stall feeding:

(1.) *Grazing.*—There can be no doubt that the important subject of pasturage merits more attention than it receives from most farmers. Early spring pasturage, and good green food for the dry months of Autumn, are especially worthy of consideration, as much of the stock suffers seriously from being turned out early on insufficient pastures, and being allowed to subsist in Summer on scanty, coarse, and dried up vegetation. It is to be hoped that increased attention to the rotation of crops, and the proper condition of hay land, will enable farmers to lay out hay land, after the second and third crop, to pasture in good

heart; and that land will be sown with grass and white clover for permanent pasture on a larger scale than at present. Bonssingault maintains that permanent pasture affords more nutriment than grass land of any other kind. Stephens on the contrary, while admitting the successful use of permanent pasture in England, states that Scottish practice is in favor of having no permanent grass land, on farms which the plough can make arable. These differences probably depend on soil and climate, and it is certain that only dry or well drained soils in good heart, are fitted for this use, excepting of course the pasturage obtained on marshes or natural meadows. Youatt remarks:

"In stocking lands, as the proportion of beasts must depend upon the fertility of the soil, it will generally be found that local custom will afford the surest guide. In the counties of Somerset and Devon, one acre or one acre and a half of the better kinds of land are allotted to one ox, to which a sheep is sometimes added. The best grazing land in Lincolnshire, we are told will, under favourable circumstances, support one ox and a sheep on an acre during the whole summer; and the former will gain 20 stones or 280 lbs, and the latter 10 lbs a quarter, or 40 lbs."

"In order to graze cattle to advantage, it is profitable to change them from one pasture to another, beginning with the inferior ones and gradually removing them to the best. By this expedient, as cattle delight in variety, they will cull the uppermost or choicest part of the grass; and by filling themselves quickly, and lying down frequently, will rapidly advance toward a proper state of fatness, while the grass that is left may be fed off with labouring cattle, and lastly with sheep. Hence it is advisable to have several enclosures, and abundantly supplied with wholesome water. When cattle are turned into fields of clover or rich grasses, they are liable, by two great eagerness in feeding to become *blown* or *hoven*. This may be prevented by feeding them well before they are turned in, to diminish the cravings of appetite."

In this province, large fields are often allowed to run out into natural grass, after being cropped or cut for hay for a series of years. By this wasteful practice, a large surface of poor pasture scarcely worth fencing, is produced. If land is worth cropping, it should pay for seeding down to pasture with grass and white clover; and if so sown, it would not only furnish better pasture, but would far more rapidly regain some degree of fertility. As a general rule, land should be broken up for cropping only when it can be sown down to hay in good heart; and after cutting for hay for a few years, it should be allowed to remain in pasture till required again in the regular rotation. If it should be necessary to break up land for cropping, without putting it through a regular course with manure, it should at least receive seed to fit it for pasture. Where tracts of land in this neglected and unprofitable state already exist, they may be much improved by top-dressing with any kind of animal or vegetable refuse, ditch cleanings, swamp

muck, marsh and creek mud, lime, gypsum, ashes, &c. Even scattering over the surface the manure that cattle leave on it, and cutting the ranker weeds, and leaving them to rot on the surface, will be found useful.

Every pasture should have some shelter, to which cattle may resort for protection from cold winds and the burning sun. In England sheds are often erected for this purpose; but hedges, trees, or clumps of bushes preserved or planted for the purpose are better and cheaper. They may be in such positions as to improve the appearance of the farm, and not to interfere with cultivation.

(2.) *Soiling of Cattle*—or feeding by means of green food cut and conveyed to them, has many advantages, especially on small and rich farms; and *in part* at least it may always be advantageously followed. Its advocates recommend it on the following grounds:—the saving of land, one acre of good grass being equal to two or three used as pasture—the saving in quantity of food consumed—the improvement in the health and comfort of the cattle, by being constantly sheltered—the increase of manure obtained, the summer manure being saved. Youatt thus sums its advantages and defects:—

“The facts and inferences above stated, fully prove the advantages of soiling. It ought not, however, to be concealed that there are some disadvantages attendant on the soiling and stall feeding of cattle, such as the additional labour and expense of cutting and carting the green vegetables home to the sheds, both in winter and summer; but they are more than counterbalanced by the saving in food that is effected—by the increased productiveness of the land and the diminished waste,—by the thriving of the cattle—the making of the dung under cover, and having reservoirs in which to preserve the urine. It has also been objected, that where large quantities of food are accumulated for a considerable time, they are liable to fermentation, and of course to waste. Such is the case with cabbages, turnips, and other roots, but it may to a very considerable degree be obviated by paying due regard to the storing of the various vegetable crops, and their economical consumption.”

“It has likewise been objected by the opponents of soiling and stall-feeding, that the cattle are heated by being confined during the summer months, and that their health is injured; but this will not be the case where stalls are so constructed as to admit a regular circulation of air, and at the same time afford shelter from the attacks of flies. The cattle may also be allowed the freedom of an open yard, indeed in that season *fold yards*, with open sheds are by many preferred to stalls. This is the practice in Yorkshire, where the management of stock is well understood indeed there is no scientific grazier who is not a strong advocate for perfect ventilation, even during the inclemency of winter. Plenty of good and wholesome air is indispensably necessary to the preservation of the health, and the fattening of animals.”

(3.) *Stall and Box Feeding*. In fattening cattle, stall feeding should

commence when the animals are half or three parts fat, a condition to which they can attain on good pasture. Of course, however, the remarks under this head apply to the method of soiling already mentioned, as well as to the winter feeding which forms so important a part of the farmers' cares in this country. "Of all vegetable productions, *good hay* is undoubtedly the best for fattening cattle; in ordinary circumstances however, it is necessary to have recourse to other things in combination with it, as cabbages, carrots, turnips, parsnips, beets and other succulent plants. Barley, rye, oat or pea meal, if mixed together, with the occasional addition of a small quantity of bean meal, may likewise be given to advantage, in the proportion of a quarter, or at most half a peck to each beast, along with hay. Of hay it may be observed, that that which is salted, even if of somewhat inferior quality, is preferable to that which is unsalted." The comparative value of the different roots, &c., will be mentioned under another head.

Various kinds of *prepared food* are in use for cattle, the principal of which are the following:—

Flax seed when crushed and boiled to a jelly. There is probably nothing equal to this for rapidly fattening cattle.

Three parts bean; pea, oat, or barley meal, with one part of linseed meal made into a jelly, form an excellent food.

Turnips, carrots, mangel wurtzel, cabbage &c., when boiled and mixed with flaxseed meal, form another useful variety.

The following is stated to be a daily allowance of one of these compounds:—

3½ gallons water,
2 lbs. linseed meal,
5 lbs. barley meal,
10 lbs. chaff.

The following admirable hints are well worthy the careful study of every farmer.

"A most important object in the feeding or fattening of cattle is that such arrangements should be made, and such a supply of food provided for winter consumption, that the grazier may be enabled to keep them throughout that trying season, and sell them when meat brings the highest prices, viz., from the beginning of February to the end of May. Thus he will not only obtain more for them than the Autumnal markets will produce, but his stock will go off freely, and every market be in his favour. He will also obtain a considerable quantity of manure, and consequently be enabled to conduct his business to the greatest profit.

"Whatever articles of food may be given, they should be apportioned with as much regard to *regularity of time and quantity* as is practicable; and if a portion of it is at any time left unconsumed, it should be removed before the next meal, otherwise the beast will possibly refuse or loathe his food.

"In stall feeding it is too common a practice to give a certain allowance every day, without regard to any circumstance; but it is well

known that a fattening beast will eat with a keener appetite on a cold day than in warm damp weather; and his food should be proportioned accordingly. By giving the same quantity every day, the animal may be cloyed. His appetite will become impaired, the food will be wasted, and several days will pass before he feeds heartily again. *Three periods of the day*, and as nearly equidistant as possible, should be selected as the feeding hours, when only such an allowance should be given to each animal as he can eat with good appetite. As he fattens, his appetite will probably become more delicate, and he will require more frequent feeding, and in smaller quantities; thus the beast will improve progressively and uniformly, while only a trifling quantity of the food will be lost. (It will be useful if convenient to *weigh* the animal occasionally, to ascertain how it thrives on the kind of food given.) Of equal importance with regularity in feeding is *cleanliness*, a regard to which is admitted by all intelligent breeders to be essential to the health and thriving of cattle. The mangers and stalls should be kept as clean as possible; and the former, if they cannot often be washed, should be cleaned every morning from dust and filth, which may easily be effected by a common bricklayers' trowel, or similar instrument. They, otherwise, acquire a sour offensive smell, which will nauseate the cattle, and prevent their feeding.

What is called *box-feeding*, consists in enclosing the cattle in close stalls or boxes, 8 or 10 feet square and 12 feet high. The lower part is sunk in the ground, so as to form a sort of tank in which the manure is suffered to accumulate, and is said to be more effectually saved than by any other mode, fresh straw is scattered over the surface every day. The cattle are not tied in these boxes. This appears a filthy mode, and at best is only suited for the latter part of the process of fattening cattle for the butcher. Cattle are said to thrive sufficiently well in the boxes, and the manure when thus trodden into a mass and then mixed with urine is more valuable. "Under all circumstances, however, a good and sufficient bed of litter is indispensable" to the health and comfort of feeding cattle. The surface at least of their bed should be clean and dry.

Under this head I place the following extracts from Prof. Johnston, part of which were published in my "Contributions toward the Improvement of Agriculture," but which cannot be too frequently repeated:—

"A proper degree of warmth, however, good housing, and good feeding, are necessary to the health and improvement of the cattle; and upon these points much alteration may be made for the better, in the ordinary practice of the Colony. It is acknowledged, at present, by chemical physiologists, that warmth is equivalent to a certain portion of food—that an animal which is exposed to more cold, will eat more—and that one which is better housed, and warmer kept, will eat less. To keep an animal comfortable, therefore, is to save food; and this alone ought to be a sufficient inducement, where a scarcity of winter food is complained of.

"In my tour through the Province, I have frequently observed how little attention appeared to be paid to the proper housing of stock. Wide chinks between the boards, or logs, of which the cattle houses or barns are built, or large openings about their feet, too often admit currents of cold air in the winter season. The most of the prevailing winds, also, find their way through the walls, and the comfort of the cattle is thus continually liable to be disturbed, the chance of their thriving interfered with, and their consumption of food increased. Those who allow such a state of their cattle houses to continue, unjustly blame the winter for what arises from their own want of care.

"One of the opinions regarding the winter, which I have inserted above, makes it a matter of complaint that much care, attention, and experience are required, to keep cattle in condition while the winter lasts. This is, no doubt, true: but the same qualifications are necessary to success in any other branch of husbandry; and he who is unwilling to bestow all he possesses of them upon the business in which he is engaged, may happen to thrive, yet scarcely deserves to prosper.

"Again, the winter feeding in the Colony is very much in the same condition in which it was over a large part of Scotland some sixty years ago. To keep his stock alive, was then the chief ambition of the Scottish farmer during the winter months, and he trusted to the nourishing grass of spring and summer to make up for the starving system of the colder part of the year. Such is very much the practice now in many parts of New Brunswick; but it stunts the cattle in their growth, and even in a money point of views is a false economy. The working ox, when spring arrives, has not sufficient strength to do all the work which the urgency of the season requires; while the animal which is sold for beef has so small a weight of muscle and fat, compared with that of its bones, and the quality of the meat is so inferior, that it is comparatively worthless in the market."

"Cattle are usually fattened on turnips and straw, or hay; but a small addition of flax seed and crushed grain will fatten them much quicker, and thereby materially diminish the quantity of food which would have been consumed, had the process been extended over a longer space of time, as it must have been without such additions."

"The use of what is called prepared food, is also a means of improvement which deserves the serious consideration of the New Brunswick farmer. The oily seeds, such as linseed, are a most valuable food for animals, and an admixture of them, with the other fodder, is not only beneficial of itself, but enables the farmer also to use up easily and profitably the straw of his grain crops in sustaining his cattle, and to convert it at the same time into more profitable manure.

"In the present condition of Agriculture in New Brunswick, I do not recommend the Provincial farmer to purchase linseed as the British farmer does, for the purpose of feeding or fattening his stock, and for the production of a rich manure for his corn fields. But the growth of a small proportion of flax upon his farm, besides yielding the fibre upon

which in the winter season the members of his household may employ their leisure hours, will furnish them with a quantity of seed which will greatly benefit his stock, and which will enable him to adopt with profit the more artificial system of feeding to which I am now referring. To give an idea of this method, and of the practical results obtained from the adoption of it, I make the following extracts from my published Lectures on Agricultural Chemistry:—

“The method adopted is, to crush the linseed, to boil it by a steam heat for three hours, with two gallons of water to each pound of the seed, and then to mix the hot liquid with the chopped straw, and tail corn, in the following proportions:—

Linseed, - - - - -	2 lbs.
Cut Straw, - - - - -	10 lbs.
Ground Corn, - - - - -	5 lbs.

This quantity is given to each full grown beast per day, in two messes.

The liquid is poured upon the mixed corn and straw on the floor of the boiling house, is turned over three times at intervals, and at the end of two hours is given to the cattle. They have two hot messes a day, and are fed punctually at the same hour.

“The times of feeding are, turnips at six in the morning, prepared food at ten, turnips at one, and prepared food again at four in the afternoon. The allowance of turnips is sixty pounds of Swedes per day, or seventy-five lbs. of Hybrids, or one hundred and twelve pounds of Globes. Under this system, the cattle thrive remarkably, are still and quiet, lie down the greater part of the day, and though they cause a large outlay at first, in the purchase of linseed, they amply repay it in the value of the dung, and in the higher price they return for the turnips and for the tail corn than could be obtained in any other manner.

“It is not necessary, in adopting this method, that the precise details above given should be followed out—that the same quantity, or proportions, of the several kinds of food should be employed—or that the crushed linseed should be boiled by a steam heat. The principle of adding turnips to the hay usually given to the cattle and sheep, and to both a certain quantity of linseed, boiled long enough to form a jelly when it cools, mixed up with chopped straw, and brought to the stock either cold or hot—this is what the farmer may, in nearly all circumstances, profitably adopt.”

Judge Peters thus states his experience:—

“I have tried flax seed in fattening two or three cattle, but having no means of crushing it, I boiled it for two hours, and mixed the jelly and seeds with crushed barley, oats, or indian corn. I gave one pint of seed and two quarts of meal, thus prepared, every day to each beast; its effects were soon visible in the silky appearance of the hair, and the more thriving condition of the animal.” Respecting shelter, he says: “There is another point connected with cattle, which requires attention. There are generally no yards to your barns; there should be high close fences, or sheds, inclosing a space for a yard to shelter the

cattle: all, however, cannot afford to make them, but all can fence in a small space adjoining their barn, to keep in their cattle, and prevent their wandering about the roads in winter, by which a part of their droppings is lost. Again in the coldest weather you see the cattle out all day, exposed to the cutting winds, and half perished with the cold. In mild weather, it is well to let them out in the yard; but on severe days they had much better be in the stable, unless your yard affords very good shelter for them. The stables can easily be made warmer, by nailing up side longers, or slabs, inside to the posts, and filling the space with sea weed, moss, straw, or tan bark, well stuffed down.

The following additional facts and hints on English feeding are from Youatt:—

“ Brewer's grains are sometimes given to cattle in an acid state; but distillers' grains differ from them in having a proportion of rye frequently mixed with the malt, rendering them more than naturally sour. Acid mixtures, however, can only be considered as preparatory to the more forcing and essential articles of dry food, without which it is impossible that any bullock can acquire the firmness of muscle and fat, which is so deservedly considered as the criterion of excellence.

“ The *wash* or refuse of malt remaining after distillation, which was formerly applied exclusively to the feeding of Swine, has of late years been used with some success in the stall-feeding of cattle. It is conveyed from the distillery in large carts, closely covered and well jointed, in order to prevent leaking. The liquor is then discharged into large vats or other vessels; and when these are about two-thirds full, a quantity of sweet hay, previously cut small, is immersed in it for two or three days, in order that the wash may imbibe the flavour of the hay before it is used.

“ One of the most successful instances of this mode of fattening cattle that has occurred within our observation, is that of Messrs. Hodgson and Co., the proprietors of Bolingbroke House Distillery, Battersea, near London. Between October and April, which is their regular working season in the distillery, they fatten about 450 cattle, having generally about 350 in the house tied up at one time, and 100 in an adjoining orchard, which are taken in to replace those that are sold off. From ten to sixteen weeks is the usual time of fattening, and the cattle are found to gain upon the average the extraordinary quantity of from two to three stones per week. Their food is wash, grains and hay—sometimes meadow and at others clover hay,—and occasionally alternated with oat or barley straw, which is sometimes, though not regularly, cut into chaff. Hay and straw are given to them twice a-day, in order that they may ruminate; and they have as much grains and wash as they can eat. In general they readily take to this kind of food, but some are four or five days before they lose their aversion to it. According to their quality, the cattle are supposed to pay from ten to twenty shillings per week.

“ The *relative proportion* of food consumed by fattening animals necessarily varies according to the size of the animals, and the nu-

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triment afforded by the respective vegetables. It has however been found that an ox will eat nearly one-sixth *per diem* of his own weight of cabbages. Fattening beasts require half a hundredweight of turnips daily, besides an adequate allowance of dry ment to counteract the superabundant moisture of these roots. For middle-sized animals, a bushel or a bushel and a-half of distiller's or brewer's grains will be sufficient, if combined with an ample portion of dry meat, given in the intervals of the distribution of the grains. Bullocks, varying from forty-five to sixty stones, consume about eight or ten stones of carrots or parsnips per day; besides an additional quantity of dry provender, that is in the proportion of one-sixth part of their own weight; and as an acre of good carrots will yield 400 bushels or 22,400 lbs., it would support such an animal 160 days, a period sufficiently long for beasts to be kept that have had the summer's grass. If they are half-fat when put to carrots, an acre would probably be sufficient to fatten two such beasts. Of potatoes, small cattle—such as those of Wales and Scotland—eat every day about a bushel a-head in a raw state, with the allowance of a truss of hay divided between four beasts. To an animal of 80 or 100 stones, about 10 to 15 lbs. of pulverized oil-cake are given daily, with at least a stone of cut hay during seven or eight weeks; the allotment of cake is then usually increased to 15 or 20 lbs., until the animal is sufficiently fat for sale. Whenever it can be conveniently arranged, the animals should not be confined to one sort of food. To mingle the food judiciously, benefits the beasts and saves the farmer money; for an animal will thrive better and cost less if fed on hay, turnips and oil-cake, given in the proportion of one part cake, four parts hay and seven parts turnips, than he would if suffered to eat the whole amount in one only of these matters.

"It has been found that forty-five oxen, well littered while fattening with twenty wagon loads of stubble, have made two hundred loads, each of three tons, of manure; the greatest and most valuable part of which would have been lost, had it not been mixed with and absorbed by the straw. Every load of hay and litter given to beasts fattening on oil-cake, yields at least ten tons of dung; and on comparing the dung obtained by feeding on oil-cake with that of the common farm-yard, it has been found that the effects produced by spreading one load of the former on an acre considerably exceeded those of two loads of the latter. The value of the manure will invariably be found to be in-proportion to the nutriment contained in the aliment. It is an old and true proverb, 'No food no cattle; no cattle, no dung; no dung, no corn; or indeed any other good crops.'"

Oil-cake cannot ordinarily be obtained in this country; but flax-seed is of course more fattening, and may often be easily procured. It should be either bruised in a machine for the purpose, or well boiled. It is the oil contained in the flax-seed or oil-cake that gives them their fattening property. Hence it has been proposed to mix cheap oils, for instance cod-fish oil, with the food of cattle, in small quantities; and

there can be no doubt that, in moderate quantity, they will produce this effect; though there can be as little doubt that, in excess, they will injure the flavour and quality of the beef.

(4.) *Driving fat Cattle to market.*—The following tests are given by Youatt as showing the fitness of the animal for the butcher, and his capability of standing the journey to market: "The general appearance of the animal shows high condition, and each bone is covered with flesh in the manner required to constitute a perfect symmetry as can be attained by a perfectly fat animal; the hips and huckle-bones are round, and the ribs, flanks and rump and buttocks well filled up, and his scrotum or purse largely developed and round. The ends of the fingers should be pressed upon him in various parts, as the ribs, hips, rump and purse. If there is an evident elasticity of these parts, and they spring back when the fingers are removed, that mingled firmness and softness well described by the term *mellowness* exists, and this is a sufficient assurance that the flesh is of thoroughly good quality."

Such being the condition of the animal, his journey to market, when there are not such facilities as railways or steamboats, should be performed in the following manner:—

"Some preparation should always be made for the journey, when the animals have to be driven far. Their food should undergo some change. The green food should be diminished, and the dry food increased, in order to prevent looseness on the road. They should be loosened from their stalls a short time twice in the day, for two or three days previous to their setting out, in order to accustom them a little to exercise, and prevent that giddiness by which they would probably be attacked after being so long confined, and also to prevent any of the dangerous pranks which they may be inclined to play on the road. That farmer would be wise who put them in the trevis and had them shod, for on long journeys several of every large herd are usually left behind and become expensive, or are sold to disadvantage, on account of their hoofs being worn through by the roughness of the roads. They should start slowly, and during the first two or three days, should not be driven more than seven or eight miles per day. In winter they should be put into a court or shed at night, and in summer turned into a pasture; gradually the day's journey may be increased to twelve or fourteen miles; but it will be dangerous to extend it beyond that distance. Plenty of time should be allowed for its completion; for if the cattle are hurried on the road, even if they do not exceed the number of miles above mentioned, they will be distressed, and off their feed, and the foundation may be laid for serious disease. It is, scarcely credible how different will often be the state of droves that have performed their journey in the same number of days. There will be a stone difference in the weight of each beast, and double the value of that in the quality of the meat. It is impossible to estimate the mischief when cattle have been overdriven, and he who is acquainted with them, will be very cautious how he purchases animals having that appearance."

II. THE DAIRY.

Under this head will be noticed the food and management of Milk Cows, and the making of butter and cheese.

1. "Cows of the same and of the best breeds will not always yield the same quantity of milk; and the milk of those that yield the most is not unfrequently different in richness. These points, however, which are of great importance to the dairy, may be easily determined by keeping the cows on the same food, weighing the quantity consumed by each, measuring their milk, and then keeping and churning it a few days separately. Comparisons of this kind are not frequently made; for farmers usually purchase whatever stock they can most conveniently or most cheaply obtain, and are then content to keep them as long as they turn out tolerably well. This, nevertheless, is exceedingly bad economy, for an indifferent cow will eat as much and require as much attendance as the best, and occasion a daily loss that will soon exceed any saving in the original price. The man who takes the pains to acquire a good stock, and has the sense to keep it, lays a sure foundation for doing well."*

In illustration of the truth of the above remarks, I quote the following from a late volume of the Massachusetts Agricultural Transactions:

"A few years since, one of the committee had a farm, which was leased on shares, appropriated to dairy purposes, on which 25 cows were kept, which were owned in common by himself and the tenant. Accidental circumstances induced a comparison between a cow which was considered the most valuable in the herd, because she yielded a large supply of milk, and a cow which had been purchased at a small price. Repeated trials were made by the lactometer, and the result was that the milk of the cow which had been held in high estimation afforded cream of only 4-10 of an inch in thickness; and the same quantity of the milk of the low-priced cow gave cream of the thickness of 1 and 4-10 of an inch, and of a much yellower color than that of the other. The cheap cow was in reality the most valuable animal. The cow which had been so highly esteemed had been in the dairy two years or more."

"Dr. Anderson, the distinguished Scotch writer on the dairy, mentions an instance of one cow, from whose milk no butter could be made. She was purchased of a farmer who kept a large dairy, by a person who had no other cow, and thus the discovery was made. Thrown into the general mass, her milk had been useless, and her keeping a dead loss to the farmer. Hence the Doctor judiciously recommends the setting, in a separate pan, the milk of every cow, to ascertain its quality, that such as give meagre milk may be fattened and sent to the slaughter-house. And we would urge it upon every farmer to test all his cows, both as regards the quality and quantity of milk they severally

*Yount.

yield, confident as we are that by this simple process, and disposing of such cows as he thus finds cannot be profitably kept, the profits of his dairy will be increased, and the character of his cows be transmitted with more certainty to their offspring."

The following general remarks on the qualities and treatment of dairy cows are quoted from the American Patent Office Reports :

"The *qualities* of a dairy cow are of still greater importance than her shape. Mildness and docility of temper greatly enhance the value of a milch cow : one that is quiet and contented feeds at her ease, does not break over fences, or injure other cattle, so much as those that are of a turbulent cast. To render them docile, they ought to be gently treated, frequently handled when young, and never hunted with dogs, beat, or frightened. A moderate degree of hardiness, life and spirits, with a sound constitution, are desirable qualities in a dairy stock, and all these are found in the Ayrshire. Some have mentioned it as a valuable quality when a cow subsists on a small portion of food : but that will depend upon the quantity of milk which one so fed will yield. If any cow gives much milk on a little food, it is one of the best qualities she can possess ; but of this I entertain doubts, which forty years' experience, inquiry and observation have served to corroborate and confirm. I have heard it asserted that some cows will yield as much milk, and fatten as fast, when fed on coarse, as others will on rich food ; but I never met with, nor do I ever expect to see, such cows. The old adage, so common in Ayrshire, that 'a cow gives her milk by the mou', has always held good, so far as I could perceive. It is of the greatest importance for dairy cows to be fed, from their earliest days, on food that has a tendency to produce the milky secretion, and even to be fed on that description of food when not giving milk. It was common in former times to rear young cows for the dairy on moors and heathy ground, and only to lay them on better pastures and dairy food when they came into milk ; but this has been found to be an improper mode of rearing a dairy stock, and they now fare much better in their youth than they did in former times. When young cows of the dairy breed are reared on moors or bad pasture, and get only as much fodder as keeps them alive, they grow up what in Ayrshire is termed 'a rough beast,' with large horns, coarse hair, thick skin, high bones, and other marks of a starveling, and they *never after become good milkers*. But when they are fed on better pasture and provided with some green food, and good fodder during the winter, they grow up proper dairy cows, having the shapes and good qualities that have been enumerated. In former times, no other attention was paid to the dairy stock during the winter but to keep them alive. They were fed on the worst and coarsest of oat-straw, or ill-preserved bog hay, cut from the marsh meadows and frequently half rotted in drying. The consequences were that the dairy cows went out to grass in May mere ghosts, lean, weak, and meagre, with their milk vessels dried up. Hence the summer was far advanced before the cows either gave much milk, or that which was of good qua-

lity. A lean, starved cow never gives so much nor so good milk as one that is in proper habit of body."

On the same subject Youatt says:—

"It will generally be found that, supposing the food to be the same, those cows that yield the least in quantity have the richest milk: but both quantity and quality are affected by the mode of feeding. When kept on old meadow grass (permanent pasture), the butter will have a better flavour than when the cows are fed on artificial grass, or even on land that has been recently laid down to pasture; and although brewer's grains or cabbages, turnips, and other succulent roots will increase the quantity of milk, yet hay, corn, oil-cake, and meal will add most to its richness. Lean cows never yield either so much or so good milk as those which without being actually fat, are kept in proper condition."

The above requisites for good milking cattle, may be summed up as follows:—

(1.) Cows of a good milking breed, in fair condition and comfortably housed in winter.

(2.) Food in such quantity and of such quality as to afford the elements of the fatty and cheesy parts of the milk. Grass and roots add to the watery part of the milk, but also contribute largely to its butter and curd. Grain and good hay give much of the cheesy constituent. Flax seed and indian corn are particularly rich in the cream or butter-making ingredients.

2. *The Food* of milch cows in general consists of the same materials already referred to, in speaking of the fattening of cattle. The following extracts give the opinions and practice of some of the best British authorities on the subject.

"In pasturing cows, it is to be observed that the quantity and quality of the milk are materially affected by driving them to a distance from one pasture to another. It is proper therefore that the pastures of milch kine should not be too distant from the cow sheds. It is also of essential importance that the pastures should be properly enclosed and sheltered, for when confined within proper enclosures, cows will feed more leisurely, and are better protected against bad weather; moderate warmth and quiet are greatly conducive to increase of milk."

"Every endeavor should be made to keep milch cows at all times in high health and good condition. If they are suffered to fall in flesh during winter, it will be folly to expect an abundant supply of milk by bringing them into high condition in the summer. If cows are lean when calving, no subsequent management can bring them to yield for that season the quantity of milk they would have furnished had they been well fed during the winter. It is not easy to persuade farmers to afford high feeding to unproductive stock, nor is it requisite for cows that are dry; but the common practice of keeping them during that period on the poorest fodder is very objectionable, and the injury to the future produce of the cow, will greatly exceed the saving in provender. During the winter, therefore, some nutritious food should be provided for them

and the animals be kept moderately warm; for they will thrive more and eat less when kept warm than when they are shivering with cold. When fed on straw or coarse hay alone, until towards the time of calving, the vessels secreting the milk become inert and powerless, and will not afterwards yield either much nutriment or of good quality, until the beasts are turned-out to pasture. The milk of lean cows is always poor and as deficient in quantity as in quality; it is therefore important that milk kine should be maintained at all times not only in good condition, but in what may be termed a *milking habit*. For this purpose a small quantity of any of the succulent roots will be found sufficient, in addition to their usual dry food. A few Swedish turnips will be essentially useful in preventing costiveness, hide-bound, and the drying up of the milk; and will be conducive, not only to the present health of the animal, but to her preservation in that state of constitution in which she will be most fit to profit by the superior nourishment to be obtained in spring."

"Good sweet hay is the staple winter food of a milch cow; the accessories are those usually employed in feeding and fattening cattle. Swedish turnips, pea or bean meal, and oil cake or flax seed will render the milk richest. But carrots, mangel wurtzel, potatoes, and parsnips may be given with nearly equal profit. Indeed, on the Continent, the mangel wurtzel is preferred to other roots for feeding cattle, and many accounts are given of the nutritive powers of the potato. One bushel per diem, with good meadow hay, is said to cause a cow to yield as much milk as she would when fed on the finest pasturage."

"Steamed food is generally admitted to produce more and better milk than raw."

"In Holland, where the management of cows is carried to the highest perfection, they are carried in the same manner as horses, and kept as cleanly. The invariably high condition of the Dutch dairy stock, is the surest proof of their good management, the chief features of which are—care in keeping the animals dry, as well as clean, and attention to the purity of the water."

"In Yorkshire, the winter keep of milk cows is straw chopped and hay, with Swedish turnips. In several parts of England steamed or parboiled chaff is very commonly fed to cows. In Scotland pea meal is a frequent article of food for cows, and a mixture of a bushel of chaff with 8 or 10 Swedish turnips, and 3 lbs. of pea meal, boiled together, is highly recommended. This mixture is given morning and evening, with hay in the meantime. To remove the flavor of Swedish turnips from the milk, a little saltpetre is mixed with the cream."

"Sea weed has of late years been given to cows in Scotland as a substitute for turnips, and is said to be very nutritious. The common rock weeds are used, and are given in the first instance boiled, and afterwards raw. Each cow receives once or twice a-day, as much of the weed as a person can conveniently carry at once between his hands." I am not aware that this has been tried in this Province, but it might be a useful resource in times of scarcity.

Salt is highly recommended as an addition to the food of milch cows. It improves the digestion, renders inferior food palatable, increases the quantity of milk, and is said to remove the disagreeable flavor occasioned by turnips.

The following bill of fare of the cows kept in the County of Middlesex, for the supply of milk to London, will astonish many persons in this country, but it may be useful as showing how much food may be profitably given to large and fine breeds of milch kine.

"3 o'clock, A. M.—Each cow a half-bushel basket of brewer's grains.

7 to 8 o'clock.—Two half-bushel baskets of Swedish turnips and one tenth of a truss of good hay. (The cows are then turned out into the air, and are tied up again at 12)

12 o'clock.—Half-bushel basket of grains.

3 o'clock.—Feed of turnips and hay, same as in the morning."

The following plan of feeding adopted by Mr. Ralston, of Pineview, Scotland, one of the largest dairy farmers in that country, is more applicable here :—

"Until the grass rises, and affords a full bite, the cows are kept in their houses, but are then sent to pasture. In hot weather they are fed on cut grass in the houses, from 6 in the morning to 6 in the evening, and are out at pasture all night, as the soil is dry and sandy. When rainy weather comes, house-feeding is discontinued. In harvest when the pastures begin to fail, the cows are fed partly on second clover, and partly on turnips scattered over their pasture. As the weather becomes colder in October, they are housed at night, and in severe weather during the day, also receiving at night cut straw and turnips. These roots are partly stored, and the supplies of them managed so as to protract the feeding. When they fail, Swedish turnips and potatoes (to which in this country mangel wurtzel and carrots may well be added) follow with dry fodder. Chaff, oats and potatoes are boiled for the cows after calving; and the calves get rye-grass and clover hay, in the latter part of spring. The cows employed are of the Ayrshire breed."

Steamed Chaff may be given to cows with great advantage. Mr. Curman used a steam-boiler containing 100 gallons, on each side of which were fixed three boxes containing each 11 stones of chaff (cut hay and straw with the husks of grain), and this by being steamed gained more than one-third of its original weight. The steam was conveyed by various stop-cocks into the lower parts of the boxes, which were mounted on wheels to be drawn to the place where it was intended to be used; but the chaff required to stand for twelve hours before it could be eaten.

Mr. Curman estimates the daily cost of food for each cow as follows :—

Chaff, 2 stones, in 2 meals, and steaming,	1d.
Oil-cake, 4 lbs.,	4
Turnips, 1 cwt,	4
Wheat straw,	1

"The average of milk on a stock of 36 milch cows was nearly thirteen wine quarts for 320 days; sold at 2d. per quart. The calves brought from £2 to £5 when reared. The produce is stated by Mr. Curman to be nearly half clear profit, estimating the manure as equal to the calves. The cows were never turned out; and to prevent their becoming lame, their hoofs were properly pared, and they stood with their fore feet on clay. One great advantage attending this method, was that most if not all the milch cows were in such condition that with a few weeks' feeding after they were dry, they became fit for the shambles, with very little loss."

"As an occasional substitute for chaff and oil-cake, Mr. C. recommends cut hay; which when steamed would make a much superior food, and greatly augment the milk, as well as benefit the health and condition of the animals. There can be little question that this is superior to straw; for straw, or even the husk of grain which is said to contain more nutriment than straw, can add but little to the product of milk. It may keep store animals from starving, but it will never improve their flesh; and it may be received as an axiom, in feeding all animals, that the value of the food is in proportion to the nutritive matter contained in its component parts. Bulk is necessary to sustain the action of the stomach; but it serves no other purpose."

"Mr. Curman gave cooked food from October to June—nearly eight months out of twelve—and his plan of treatment was adopted by several farmers in different parts of the kingdom, with the most complete success. It is partially practised in the Isle of Man, where the cottagers have long been in the habit of pouring boiling water on the chaff with which they winter-feed their cows. It has also been adopted in some parts of Scotland. There are however many practical and scientific men who still decidedly object to cooked food of any kind, and particularly roots, being given to milch cows."

Pea Meal is given by some of the Scotch dairy men, by whom it is said that no food is found to produce so much profit. The following method of preparing it, combined with chaff and turnips, as customary at Kyle, in Ayrshire, and which we copy from a recent publication, seems to merit particular attention:—

"Take a bushel of chaff and eight or ten sound yellow or Swedish turnips, having the tops and tails carefully taken off, and boil them together four or five hours. Add as much water as will cause the hand to move freely through the mass. Squeeze down the turnips and add three pounds of pea meal. Give this to a cow in the morning, and the same in the evening, with as much sweet hay as she will eat up clean five times a day; and without much expense, her butter will be as rich and of as fine flavor as can be produced in winter. Should the peculiar flavor of the turnip be detected, which is not likely, a small quantity of saltpetre put to the cream will remove it."

3. *The Building for the Dairy* should be convenient, but not ex-

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posed to effluvia from the cow-house or farm-yard; and it should be maintained, as far as possible, at an equal temperature. A pump or spring of water within, is a most valuable addition to it. In Britain, such buildings are constructed of stone and brick, with walls of great thickness: and great care is taken to secure cleanliness, and to exclude excessive heat or cold. In this country, in cases where convenient and cleanly underground cellars cannot be employed, buildings of wood, filled in with saw-dust, eel-grass, or dry tan bark, will answer the purpose well. Where possible, the combination of a dairy with an ice-house, is very desirable. The following extracts are given, not as being especially adapted to this country, but as shewing the care employed in the construction of these buildings in Britain, where the extremes of temperature are so much less than with us:—

“If it can be managed, it should be well sheltered by trees, or the situation of the ground. The grand principle of construction should be to preserve an equable temperature in winter and summer. A pump should always open into the dairy. The walls should be thick, so as to preserve, if possible, the proper temperature, or from 50° to 55° of Fahrenheit's thermometer. Some have recommended double walls, with a space of one or two feet or more between the wall and the lath and plaister. Mr. Marshall advises walls six feet thick, one foot on the inside to be brick or stone—the outside of earth and sod. The roof should be of thatch, and three feet thick, and should project over the walls. The floor may be sunk a few feet below the surface, but must be quite free from damp. The dairy should be paved with stone, brick or tiles, with the joinings well cemented together. It should be washed daily in summer, but great care should be taken to dry it immediately, as damp rapidly promotes the putrefaction or turning of milk. A butter dairy should have three compartments, one for receiving the milk, one for churning, and the third for cleaning the vessels. A cheese dairy requires a fourth for storing the cheese.”

When an equable temperature cannot otherwise be obtained, stoves and other means of artificial heating are employed; and in large dairies the churning or cheese-making room is supplied with boilers for warming water, milk or whey. There has been much difference of opinion respecting the most suitable material for *creaming dishes*. Earthenware answers well; but in Scotland cast iron dishes, tinned inside, are affirmed to throw up one-third more cream than any others; and in the United States tin dishes are very generally preferred. It seems, in general that metal vessels, by more rapidly cooling the milk, give more cream than others.

4. *Composition and Properties of Milk.*—The milk of the cow consists, according to Henry and Chevalier, as quoted by Professor Johnston, of—

Casein, (pure curd,) - - - - -	4.48
Butter, - - - - -	3.13
Milk sugar, - - - - -	4.77
Saline matter, - - - - -	0.60
Water, - - - - -	87.02
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These proportions vary, however, in the milk of different cows, and in that of the same cow under different circumstances.

Milk, like most of other animal fluids, is liable to a variety of chemical changes, on which its various uses greatly depend.

(1.) When left at rest for several hours the butter or fatty matter, which in the fresh milk was merely mechanically mixed, separates and floats to the surface: where still in a state of partial mixture with the other ingredients, it constitutes cream. Even in the cow's udder, the cream tends to rise to the surface; hence the last drawn portions of milk are the richest. The more the milk is stirred or agitated in milking or after, the less readily does the cream rise; and the deeper the dishes in which it is kept, the more slowly does the cream rise. In the former case the creamy particles are more thoroughly mixed with the whole milk, and in the latter they have more milk to rise through.

(2.) When the cream is allowed to sour, or soured by the action of the churn, the curdy and oily parts become completely separated from each other and from the watery part, and the butter is collected in a pure state.

(3.) The *casein*, or curd, though itself insoluble in water, is kept in a state of solution in the new milk by the agency of a little alkaline matter, chiefly soda, which renders it soluble in the whey. When the milk becomes acid, whether by the change of its sugar into lactic acid, or the acid of milk, or by the addition of an acid or of rennet, the casein becomes insoluble, and forms curd, which, by the application of a gentle heat, may be consolidated and separated from the whey.

(4.) The remaining whey contains much of the saline matter of the milk, its sugar or the acid produced from it, and usually small residual portions of the fatty and cheesy matters.

In addition to distance from the time of calving, and other well known causes, the following are the principal circumstances which effect the quality and quantity of milk:—

(1.) *Age of the Animal.*—Cows yield the best milk after their third or fourth calf; and after this time it continues to be excellent, until they are ten or twelve years of age.

(2.) *Climate and Season.*—Moist and temperate climates are favorable to the production of much milk. In hot and dry climates the quantity is less but the quality richer. Cool weather favours the production of cheese and sugar in the milk; warm weather that of cream. Exposure to intense cold diminishes the quantity and deteriorates the quality.

(3.) *Time of Milking.*—A cow milked only once a day will yield a little more butter than if milked more frequently. When milked three times a day, the quantity of milk is much increased. The morning's milk is of better quality than that of the evening.

(4.) *Treatment and Temper of the Animal.*—The best milking condition is one of quiet and repose. Every thing that frets, annoys, or disturbs the animal, or excites her to great muscular exertion, interferes with the secretion of the milk.

(5.) *The Race or Breed of the Animal.*—This is of much importance, but has been already noticed.

(6.) *The Kind of Food.*—Many important facts will be found under the head "Food of Milch Cows," but the experiments hitherto made have failed to shew those marked differences which we should have anticipated from great changes of food. The reason is that the secretion of milk on a particular day is not dependant solely on the food of that day; and that many causes are in operation simultaneously.

(7.) *The Form and Constitution of the Individual Animal.*—Much information on this subject will be found under other heads. Youatt says:—"A milch cow should have a long thin head, with a brisk but placid eye; should be thin and hollow in the neck, narrow in the breast and point of the shoulder, and altogether light in the fore quarter—but wide in the loins with little dew-lap, and neither too full fleshed along the chine, nor showing in any part an inclination to put on much fat. The udder should especially be large, round and full, with the milch-veins protruding, yet thin-skinned, but not hanging loose or tending far behind. The teats should also stand square, all pointing out at equal distances and of the same size, and although neither very large nor thick towards the udder, yet long and tapering toward a point. A cow with a large head, a high back-bone, a small udder and teats, and drawn up in the belly, will, beyond all doubt, be found a bad milker."

It is quite certain that cows of the same breed and age often differ materially in their produce of milk; and though the form is a good guide, this also often fails to be a certain indication. It is therefore useful for the dairy farmer to test by experiment the actual quantity and quality of the produce of each cow when in different conditions, and thus to ascertain the real value of the different individuals of his stock. This is the more necessary as it appears that certain breeds and kinds of animals, may thrive better or worse on certain farms or kinds of feeding than on others.

5. *The Making of Butter*—being a very important part of dairy husbandry, and the qualities produced by different makers being very different, I give here an abstract of some of the best methods in use in Britain and America, with some preliminary hints on milking and creaming:

"In milking, if a cow is roughly handled, it is not only painful to

her but will cause her to withhold a portion of her milk, whereas if it is gently drawn, she will yield it freely. It is of importance that it should be drawn to the last drop, for the last part is the richest; and whatever milk is left in the udder is liable to coagulate and injure the udder, as well as lessen the subsequent meals of milk. It sometimes happens that cows are restless and fidgetty; but they should by no means be harshly or severely treated at such times. If the udder is hard or painful it should be fomented with lukewarm water, and gently stroked, by which simple expedient the cow will generally be brought into good temper and readily yield her milk. It is also proper to feed the cows at the time of milking, for while eating they give out their milk with greater freedom.

"It is a well known fact that cows, when milked thrice in the day, yield more in point of quantity and milk of as good if not better quality, than they will under the common mode of milking them only morning and evening.

"Very particular directions should be given that the cows are driven slowly to the place of milking. If they are hurried in ever so slight a degree, the creaming of the milk will not so readily or perfectly take place. In like manner, milk should never be much carried about or allowed to cool in the pails, before being put into the milk-pans."

"The milk should be poured through the strainer into the milk-pans, which should not exceed three inches in depth. The milk-pail should then be rinsed with about a quart of cold water, which also may be poured through the sieve into the milk-dish. If any flavour of turnips, &c., is apprehended, add one-eighth part of boiling water to the milk, or a few drops of a strong solution of saltpetre."

"Thick milk diluted with water, produces more cream than if not diluted, but of inferior quality. Thick milk produces less cream than thin, but of superior quality."

"It is best to put the milk of each cow into the cream-pans separately, or at most the milk of two or three cows together. By these means unnecessary agitation will be avoided, and it will be possible to know the different qualities of the milk of different cows."

"To make butter of extra fine quality, the milk of those cows that yield a poor quality, should be rejected, and also the milk first drawn from each cow."

"The cream having separated, in about twenty or twenty-two hours, may be removed by skimming, or the milk may be let out by taking out a plug in the bottom of the pan. When collected, the cream should be placed in a deep covered vessel, and stirred every time a fresh quantity is added. If the cream from each milking has been kept separate, it may remain from two to four days in warm weather before being churned; but if sweet cream is mixed with that which is sour, they ferment and become putrid if the churning is delayed beyond three days. This may be in some degree prevented by stirring, but it is generally considered best to keep the cream from each milking apart, and thus allow each to become sour by itself.

"In some countries the separation of the cream is not thought to be sufficiently complete by this mechanical process, but after the milk has remained from twelve to twenty-four hours in the pan; it is put over a slow fire, where it remains until the first bubble raises the surface of the cream. The pan is then taken off, and put away for eighteen or twenty-four hours to cool. At the end of this time, if the quantity of milk is considerable, the cream will be an inch or more in thickness. It is cut with a knife into squares, removed by a skimmer and called *clotted* or *clouted* cream. It has a peculiarly sweet and pleasant taste, churns readily, and gives a butter retaining the same agreeable flavour. The remaining milk however is nearly worthless."

"The *churning* requires considerable art. It must not be too rapid or violent, nor must it be too slow and gentle. In the first case, and especially in summer, it would become ill-tasted and ferment,—in the latter it would not form at all. The temperature should be carefully regarded. In summer it will be necessary to immerse the pump churn about a foot in cold water, or to pour water over the rotatory churn. In winter, a little warm water should be added."

In washing the butter, which may be done on a board, the great object is to squeeze out and wash away every particle of buttermilk, without beating or handling the butter too much. Abundance of water may be used, as this will remove nothing that is useful to the butter, and it is of great importance to keep the hands as cool as possible during the operation.

In Holland and some parts of Ireland and Scotland, the whole milk is churned without any creaming. In Holland the process is as follows:—

"The milk is put into deep jars in a cool place, each portion milked at one time being kept separate. As soon as there is the least appearance of acidity, the whole is placed in an upright churn. When the butter forms in kernels, the whole is poured on a sieve which retains the butter and allows the milk to pass through."

In Scotland the process is somewhat different:—

"The new milk is placed for six or twelve hours in coolers. It is then emptied into a large vat or tub. If the vat is sufficiently large, and a second meal of milk has become cold before the first shows any acidity, the two are mixed together. A lid or cover is then put on the vat, and it remains undisturbed, till the milk has soured, and has formed a *lapper* or curdled. When in this state it is fit to be churned, but may remain in this state two or three days, if the lapper is not broken; if broken however, it must be churned immediately, else the whole will be spoiled. When put into the churn, the clotted milk is agitated for a few minutes, and as much hot water added as will raise the temperature to about 70°. The churning will then occupy from two hours to two hours and a half, and the butter will be sweet and good."

It would seem that the quantity of butter does not vary much,

whether the cream or the whole milk is churned; and the preference will be given to one or the other, in proportion to the demand that there may be for skimmed milk and skimmed milk cheese, or for butter milk.

On the average yield of butter per cow, and the quantity which a good one well fed should yield, Youatt remarks:—

“Four gallons of milk will generally produce about a pound of butter, and a good cow, in order that dairy husbandry may remunerate the farmer, should yield 200 lbs. in the course of the year; beside this, there is the value of the calf, the skimmed milk and the butter milk.” In applying such a calculation to this country, we have to consider the lower price of butter and higher price of labour here than in England, and on the other hand the high rents and taxes which the English farmer pays. It must also be observed in calculations of this kind, that it is the *extra feed*, above that required for sustaining life and keeping up condition, that pays the whole profit. A cow capable of yielding 200 lbs. of butter, may be fed in such a manner as to give little or no return. Every additional pound of good food gives a proportionate profit; and when fed up to that point which enables the animal to yield the largest amount and best quality of milk of which she is capable, the profit is greatest.

The following brief account of butter-making in the State of Maine, is from the Patent Office Reports for 1852:—

“For the past year I find the product of my dairy to have been 125 pounds of butter per cow, which is probably not far from a fair average; though, on account of the severe drought, this estimate may be too low. The cost of cheese is usually considered as half that of butter, though the making of the latter here is regarded as most profitable, as butter is not imported into the State in so large quantities as cheese, as it does not bear handling and transporting so well as the latter. In the treatment of milk for making butter in the winter, we pursue a course somewhat peculiar, which is as follows: After setting the milk in common tin pans for 12 hours, scald it, by setting the pans on iron vessels of boiling water, on a common cooking stove, and, after cooling, skim the cream off. By this mode of treatment the butter does not become bitter, as usual with winter butter, and is nearly as yellow as summer butter. Besides, by this course, the process of churning is very much accelerated. The process before mentioned is pursued by some in making summer as well as winter butter. Our rule for salting butter is, 1 ounce of finely pulverized rock-salt to the pound of butter, applied after thoroughly excluding all the butter-milk, by washing in cold water and rolling with a common rolling pin; then pack in a clean barrel, either in lumps or solid, and completely cover with pickle as strong as it can be made; then add a bag of coarse rock-salt, and see that there is always undissolved salt in the bag. Butter made and packed in this way we find to keep perfectly sweet the whole year. Average price of butter here is fifteen cents per pound.”

The Salting of Butter is performed in England as follows :

"The firkins are seasoned by frequent washing, and exposure to the air, or by scrubbing the firkin with salt and water boiled. It is then dried and salt strewed on the surface, before the butter is put in. In the ordinary process of salting, after separating the butter milk as completely as possible, salt in the proportion of about one ounce to a pound of butter is worked in thoroughly, so as to become incorporated with the mass; for if not equally mixed in every part, the butter will acquire two colours, or become 'pyety' or 'pinsowed.' The salt should be of the purest kind, well dried and broken down, but not completely pulverised. Bad salt will soon cause it to become rancid. The following preparation is recommended as better than salt alone:"

"Two parts best salt, and one part each sugar and saltpetre, well mixed; one ounce to each pound of butter. Incorporate it thoroughly with the mass, and close up for use."

"It will be necessary to keep butter thus prepared for two or three weeks after it is cured, before using; as otherwise it will not taste well; but if properly cured according to the above prescription, it will continue perfectly sweet for three years or more."

"After strewing salt on the bottom of the firkin, the butter may be packed in, thoroughly moulding each layer into that beneath it. When the cask is full, more salt should be strewed on the surface, and the head put on. If the butter has been well freed from milk, and the salt moulded into it quite dry, it will not shrink from the cask. This is always regarded as one criterion of the goodness of the butter."

6. *Cheese-making* is much more difficult than the manufacture of butter, and much less successfully practised in Nova Scotia, no part of which, with the exception of Annapolis, is celebrated for making a good article. The temperature at which the milk is kept, and at which it is curdled, is of great importance; and want of knowledge in this point is a frequent cause of failure. The milk should be kept beforehand at a temperature not under 50° nor over 55°. It should be curdled at a temperature which, according to different authorities, may vary from 85° to 95°. If the temperature be too high, the curd will be tough, if too low it will be soft and difficult to separate from the whey. Every cheese maker who has not thoroughly learned by experience to distinguish the exact temperature, should have a thermometer, which can be purchased for a few shillings, for the purpose.

"The greatest care should be taken to extract every particle of whey from the curd; for the cheese is apt to heave when any whey remains, and if any part becomes sour, the whole will acquire a disagreeable flavour. Similar effects are produced by the use of an immoderate quantity of rennet. It is also apt to fill the cheese with small holes, which imperfection will likewise be produced if it is allowed to remain too long on one side. The cracking of the cheese usually arises from the exterior drying too fast, and is caused by the air of the cheese room

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being too dry or warm. An experienced dairyman is of opinion that from nine to twelve months are requisite to ripen cheese of any kind, if from fourteen to twenty pounds weight: and he lays it down as a rule, that the hotter it is put together the sounder it will be, and the cooler, the richer and the more apt to decay. He also recommends the use of a small quantity of *loppered* or sour milk to prevent its poring. It is a good practice to strew a little moss or fine hay on the shelves on which the cheeses are laid, to prevent them from adhering and contracting dampness. We add, as general maxims, that great cleanliness, sweet rennet, and attention to the heat of the milk and breaking the curd, are the chief requisites in cheese-making."

The following extracts describe the processes employed in making some of the most generally esteemed kinds of cheese:

Cheshire Cheese.—"The evening's milk is set apart until the following morning, when the cream is skimmed off; it is then poured into a brass pan, heated with boiling water, in order to become warm; one-third part of that milk is thus heated.

"The new milk obtained early in the morning, and that of the preceding night being thus prepared, are poured into a large tub, together with the cream. Into this is placed a piece of rennet, which had been kept in warm water since the preceding evening, and in which a little Spanish Arnatto (a quarter of an ounce is enough for a cheese of sixty pounds) is dissolved. The whole is now stirred together, and covered up warm for about half an hour, or until it becomes curdled; it is then turned over with a bowl and broken very small. After standing a little while, the whey is drawn from it, and as soon as the curd becomes somewhat more solid, it is cut into slices and turned over repeatedly, the better to press out the whey."

"The curd is again removed from the tub, broken by hand into small pieces and put into a cheese-vat, where it is strongly pressed by hand and with weights, in order to extract the remaining whey. After this, it is transferred to another vat or into the same, if it has in the meantime been well scalded, where a similar process of breaking and expressing is repeated, till all the whey is forced from it. The cheese is now turned into a third vat, previously warmed, with a cloth beneath it, and a tin hoop or binder put round the upper edge of the cheese, and within the sides of the vat; the former being previously enclosed in a clean cloth and its edges put within the vat. These various processes occupy about six hours, and eight more are requisite for pressing the cheese under a weight of 14 or 15 cwt. The cheese during that time should be twice turned in the vat. There are several holes bored in the vat which contains the cheese, and also in the cover of it, through which long skewers are passed in every direction, the pressure being still continued. The object of this is to extract every drop of whey. The pressure soon obliterates all these punctures, and the cheese is at length taken from the vat, a firm and solid mass."

"On the following morning and evening, it must be again turned

and pressed; and also on the third day, about the middle of which it should be removed to the salting chamber, where the outside should be well rubbed with salt, and a cloth binder passed round it, which serves as a lining to the vat, but is not turned over the upper surface. The cheese is then placed in brine extending half way up it in a salting tub, and the upper surface is thickly covered with salt. Here it remains for nearly a week, being turned twice in the day. It is then left to dry for two or three days, during which it is turned once, being well salted at each turning, and cleaned every day. When taken from the brine, it is put on the salting benches, with a wooden girth round it of nearly the thickness of the cheese, where it stands about eight days, during which time it is again salted and turned every day. It is next washed and dried, and after remaining on the drying-benches about seven days, it is once more washed in warm water with a brush, and wiped dry. In a couple of hours after this, it is scoured all over with sweet whey batter; which operation is afterwards frequently repeated; and lastly, it is deposited in the cheese or store room, which should be moderately warm, and sheltered from the access of air, lest the cheese should crack, and turned every day until it has become sufficiently hard and firm. These cheeses require to be kept a long time; and if not forced by artificial means, will scarcely be sufficiently ripe under two or three years.

Much of what is called *Double Gloucester* and *Cheddar Cheese* is made by the following simple process:—

“When the milk is brought home, it is immediately strained into a tub and the rennet added, in the proportion of about three table-spoonfuls to a quantity sufficient for a cheese of twenty-eight pounds; after which it remains undisturbed about two hours, when it becomes curdled and is then broken to pieces. That being done, three parts of the whey are warmed, and afterwards put into the tub for about twenty minutes. The whole whey is then again placed over the fire, made nearly scalding hot and returned into the tub, in order to scald the curd for about half an hour longer, after which part of the whey is again taken out, and the remainder left with the curd till it is nearly cold. The whey is then taken out or poured off, the curd broken very small, put into the vat and pressed; it remains there nearly an hour, and is then taken out, turned and put under the press again until the evening; when it is turned again and left until the next morning. It then finally leaves the press and is salted once a day for twelve days.”

“*Dunlop Cheese* is made in the counties of Ayr, Renfrew, Lanark, and Galloway, of sizes from twenty to sixty pounds. After the milk is brought to a proper degree of heat it is mixed with the cream, which had been previously skimmed and kept cool. The milk is then poured into a large vessel, where the rennet is added to it, and the whole is closely covered up for ten or twelve minutes. If the rennet is good, it will have curdled the milk which is gently stirred. The whey then begins immediately to separate, and is taken off as it gathers, until the

curd becomes tolerably solid. It is now put into a strainer, the cover of which is pressed down with any convenient weight. After it has stood for some time and is tolerably dry, it is returned into the first vessel or dish, where it is cut into very small pieces by means of a cheese knife. It is thus turned up and cut every ten or fifteen minutes, and also pressed with the hand until all the whey is extracted. The curd is now once more cut as small as possible, and salted, care being taken to mix it minutely with the mass. Lastly, it is put into a *chest* or *chessart*, a stout dish with iron hoops that has a cover fitting exactly into it—a cloth being placed between the curd and the vessel. In this state it is submitted to the action of the cheese press, whence it is occasionally taken and wrapped in dry cloths, until it is supposed to have completely parted with the whey. It is then laid aside for one or two days, when it is again examined; and if there is any appearance of whey, the pressure and application of cloths are repeated. As soon as it is ascertained that the whey is extracted, the cheese is kept for a few days in the farmer's kitchen, in order to dry it before it is placed in the store, where a smaller degree of heat is admitted. While there it is turned three or four times a day, until it begins to harden on the outside, when it is removed to the store and turned twice in the week afterwards. When the cheese is cured, various modes are adopted to polish it for sale, but these are injurious rather than beneficial, nothing farther being requisite, besides turning it, than to rub it occasionally with a coarse cloth, especially after harvest, for at that time it has a tendency to breed mites.¹⁷

In making *Skim Cheese*, the principal difference is that the rennet and cheese should be put together cooler, otherwise the cheese will be hard and flinty. Very particular directions for making skimmed milk cheese, and also butter-milk cheese, will be found in Stephen's Farmer's Guide. The latter is prepared by heating the butter-milk till the curd sinks, separating the whey, salting, and hanging up in a coarse linen bag.

It is generally admitted that no part of farming is more steadily profitable than the dairy when well managed, but none requires more skill and more close and unremitting attention to render it productive. It deserves therefore and requires that every detail of every process should be carefully studied and diligently watched in the whole of its practical performance. It belongs in most of its departments more especially to the Farmer's wife and daughters, who should pride themselves in its cleanly, tasteful, prudent and scientific management.

III. FARM HORSES.

On this subject I shall confine myself to extracts, principally from Youatt, on the training and feeding of horses. The latter topic is especially worthy of attention, as our methods of feeding differ materially from those in Britain, and may very possibly admit of improvement.

1. "*The process of training* horses for the saddle often requires considerable skill in the teacher. For those intended for the plough, it is very simple; but for both, the best means are gentleness and patience. The horse is an animal possessed of great intelligence. He is capable of strong attachment, and of equally strong resentment. If treated with kindness, he becomes docile; but severity generally fails of its object, and renders him intractable. There is certainly much difference in the natural temper of colts, some requiring more care and time to reduce them to obedience than others; but even the most restive may be rendered manageable by kind and gentle usage."

"From the moment of its being weaned, the foal should be accustomed to the halter, and wisped over and occasionally tied up; but this should be done by the person who feeds it, and never entrusted to lads, who will probably worry the animal, and teach it dangerous tricks; nor to any hasty, ill-tempered man, who would be likely to ill-treat it. The colt will thus early become accustomed to be handled, and will consequently occasion much less trouble than if it had been previously neglected."

"After the colt has been a day or two in the stable, a bridle should be put on, but with a small bit at first, instead of the large one usually employed by horse-breakers, and which, by the horse's champing on it with impatience, sometimes occasions the mouth to become callous. He should then be led about, and accustomed to obey the rein in turning and stopping, which he will very soon learn to do."

"After a few days he should be completely harnessed, and put into a team with some steady horses. At first he should neither be whipped nor forced to draw, but left quietly to walk with the other horses. In a very short time he will imitate them, and begin to pull. It may then be proper to let some one mount him, even if he should not be intended to be commonly ridden, as it will render him the more docile. This will be best done when he is in the team, as the other horses will prevent him from plunging. No violence should be used, for while he will readily learn everything that he is taught, he will also recollect many things that it might be wished he should forget; thus if he is beaten for starting at any object, he will only start the more on meeting it again, for he will remember the chastisement it occasioned; and if hurt in shoeing or any other occasion, he will not soon forget the pain it occasioned, nor suffer a repetition of it without impatience."

"The proper period of castration depends on the breed of horse and the purpose for which he is designed. On the colt destined for common agricultural purposes, it should always be performed before he is weaned—perhaps when he is six or eight months old. It is an operation then attended with little danger, provided the weather is not then too hot. If the colt, however, is intended either for heavy or for speedy draught, the operation should be delayed until the animal is a year or a year and a half old, when his fore quarters will be tolerably developed. It should then be performed as speedily as possible, lest he should become too heavy before, and perhaps a little self-willed. May or September are the best months for the performance of this operation."

2. *Food of Farm Horses.*—"To feed economically and yet efficiently, is the great desideratum. It is a well known fact, that two well fed horses will do the work of three, if not four, that are badly kept; hence it will be evident that to keep a small number of horses, and to keep them well, is more advantageous than to have a larger number and feed them so that they are never up to *par*, or capable of doing a hard day's work. There are no doubt many persons who keep their teams expensively for the mere vanity of having them in good condition, while there are others who obtain continuous service from their farm horses under a very different regimen."

"Mr. Reid, in his admirable essay on the "Management of Farm Horses," gives the following analysis of the component parts of different substances used as food for horses. He classifies them under the heads of *azotised* or flesh-formers, and *non-azotised* or fat-formers:—

	Organic matter.	Azotised.	Non-Azotised.
100 lbs. of Oats contain	80	11	69
" Peas,	80	30	50
" Hay,	76	8	68
" Potatoes,	25	2	23
" Barley Meal,	82	14	68
" Turnips,	10	1	9
" Beans,	83	31	52

"He also gives the following formulæ as guides for winter feeding. No. 1. is for a moderate sized horse, and No. 2 for a larger animal, per week:—

No. 1.		No. 2.	
s.	d.	s.	d.
7 pecks oats, (70 lbs.,)	3 6	7 pecks oats, (70 lbs.,)	3 6
8 " chaff,	1 0	1 " beans, crushed,	1 6
2 " bran,	0 6	8 " chaff,	1 0
120 lbs. hay,	3 0	2 " bran,	0 6
7 " beans,	0 6	140 lbs. hay,	3 6
	8 6		10 0

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"In order to reduce still further the expense of horse-keeping, various trials have been made of the nutritive powers of potatoes, Swedish turnips, carrots, and other esculent roots, all of which have been found sufficient for the support of the cattle during moderate work, and when given with plenty of hay: They have even been found to answer the purpose when given with straw only, but in that case the work must have been very light, for horses should have food of a quality proportioned to their work, and if that is considerable, some corn is absolutely necessary. In fact, bulbous and esculent food is, especially when given with bruised corn or barley meal, better adapted for bringing horses intended for sale into condition, than for maintaining them in working order. The quantity of azotised food may indeed be diminished by the aid of roots, and straw may be substituted for hay; but, in every instance the quality of the food must be in proportion to the required exertion, or the horse will be injured to a degree which the saving effected in his keep will not repay. Theorists advance instances to the contrary, but every practical farmer knows that hard work can be sustained only by good feeding. This, however, may be carried to excess; and although farmers cannot generally be accused of being too lavish of corn, yet the allowance of hay is often far too profuse. It is indeed a common practice to cram the rack with an unlimited quantity of this fodder, the consequence of which is that gross feeders stand eating all the night, instead of lying down to rest. Their stomachs become unnaturally distended, and many serious disorders are generated that might have been avoided by a more regular and limited allowance. Nor is this the only loss this system causes the farmer; quantities of the fodder are pulled down, trampled under foot, and utterly wasted. The great secret of feeding well is to feed regularly at certain hours, and in certain and sufficient quantities, and not to allow any intermediate eating. A full meal should not be given immediately after a horse has come in from a hard day's work; let him have a little food to take off the edge of his appetite then, and the remainder an hour or two afterwards when he has rested."

"Of the esculent roots, sliced potatoes and carrots are those most commonly given; and it is a singular fact that though the former contain the greatest proportion of nutritive matter; horses thrive best on the latter. When potatoes are steamed and deprived of their water, they form a tolerably substantial food; but the trouble and expense of steaming them are great objections to giving them in this way, and when raw, carrots are preferable. Horses are fonder of them; they have a visibly good effect upon their coat; they are found advantageous to the wind; and they correct the binding effect of dry food. But too many given raw are apt to produce evils of other kinds, and horses which have been fed on them for a short time, often become so fond of them as to refuse other food."

"In some parts of the North, the refuse oats, or any other refuse grain, are mixed with wheat chaff or cut hay and boiled; and of this

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mess, after it has become cool, almost a pailful and a half is given to each horse once a day, generally when his work is over. This is a judicious and economical practice, as very light corn is often swallowed whole when given dry. When horses are kept partly upon straw, it is an excellent mode of keeping their bowels in order; but when put to hard work and fed on hay, its constant repetition would perhaps be too relaxing.

"Mr. Spooner, in his Prize Essay on the "Management of Farm Horses," gives from his personal knowledge the following estimates of the cost per week of feeding farm horses. From the middle of November to March, when work is light, they receive:

	s.	d.		s.	d.
Oats, 1½ bushel,	4	6	Oats, 2 bushels,	6	0
Straw, 1½ cwt., at 2s.,	3	6	Beans, 1½ peck,	2	3
Swedes, 42 lbs.,	0	4	Hay (not clover), 1 cwt.,	4	0
	8	4		*12	3

"This second allowance is given as the spring work comes gradually on. When barley and turnip sowing are over and green food becomes abundant, the corn is reduced to—

	s.	d.
1 bushel, costing,	3	0
With green food, worth, say,	5	0
	8	0

"As the autumn work approaches, the spring feeding is again given."

In the summer feeding of horses, three methods are commonly practised in England—"1st, to turn them out on pastures; 2ndly, to feed them on the field or artificial grasses, either cut or grazed; 3rdly, to soil them on green food in the stable or yard." In the second method the horses must be tethered, or confined by temporary fences to a small portion of the ground. In the third method, they are constantly kept in the stable and farm-yard. These two last methods have many obvious advantages, and will no doubt become more general here, as arable farming extends, and summer tillage by horse power becomes more constant and general.

"Cooked food is now much used by farmers; and under proper management, with great advantage. Steamed or boiled potatoes, turnips or carrots, are given; and the two former, and especially turnips, with great success. Boiling is preferable to steaming. About 40 lbs. of turnips is the average allowance for each horse, and this should be given warm but not hot, and with the admixture of bran, chaff or ground barley, and about a handful of salt. The food must be cooked as it is

* The prices attached to these estimates are given, because, though different from prices here, they form an element in the writer's ideas of economy.

wanted, for if kept any time it becomes acid and ferments, and in this state is exceedingly injurious."

"Experience has also demonstrated the advantage of crushing and bruising grain, and even grinding it, and cutting or chopping fodder; these processes facilitate digestion, by bringing the nutritious portions of the food more completely in contact with the stomach, and thus enabling them to pass with greater ease into the system, and afford the animal more sustenance, while to the farmer they are a means of effecting considerable saving—considerable, if we only regard the actual amount of hay, straw, &c., which is wasted when these matters are given in their natural state; considerable, if we look at the quantity of undigested grain voided in the excrements of the horse; and still more considerable when we mark the difference in the condition of those horses which are fed on crushed, chopped and cooked food, and those which get their allowance in its natural and crude state"

IV. SHEEP.

1. *The Breeds of Sheep* are numerous, and differ from each other in size, hardiness, readiness to fatten, and length and fineness of wool. The following table from Youatt gives a general view of their qualities:—

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SYNOPSIS

OF THE
Different breeds of Sheep in Great Britain.

	Average weight of wool per Fleece.	Average weight of Wethers per Quarter.	Years old when killed.
Heath,	Black faces and legs,	Coarse long wool,	4½
Exmoor,	do.	Long wool,	14
Norfolk,	White	Fleece middling length & quality,	2½
Wilts,	Black	Fleece moderately fine wool,	15
Dorset,	White	Short and moderately fine wool,	18
Dean Forest and Mendip,	do.	Fleece middling length & quality,	20
Dishley,	do.	Fleece middling length & quality,	18
Lincoln,	Do.	Fine short wool,	3½
Dashley and Lincoln,	Do.	Long wool,	4½
Komney Marsh,	Do.	Do.	2
Teeswater,	Do.	Do.	3
Dartmoor Notts,	Do.	Do.	2
South Down,	Do.	Do.	3
Carnock Heath,	Do.	Do.	2
Ryeland,	Do.	Do.	2
Shropshire Mof,	Do.	Do.	3
Cheviot,	Do.	Do.	3
Improved Cheviot,	Do.	Do.	4
Hardwick,	Do.	Do.	4
Shetland,	Do.	Do.	4
Merino,	Do.	Do.	5
	Do.	Do.	6

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10	10	8	16
2	1 1/2	3	
Do.	Do.	Fine cottony wool,	
Do.	Do.	Short and very superior wool,	
White	do.	Colours various,	
Do.	do.	White faces and legs,	
Polled,			
Cheviot,			
Improved Cheviot,			
Hardwick,			
Shetland,			
Merino,			
Horned,			

Of the above varieties, the following merit a more particular notice :

(1.) *The Heath or Black-faced* are distinguished by their black faces, with, in the pure breed, a lock of white wool in the forehead. They are hardy, with short and firm carcass, and "long, open coarse and shaggy wool." Extensively reared in the northern counties of England and in Scotland, and would suit well here in exposed situations, and where long coarse wool is desired.

(2.) *The Exmoor*—are shorter wooled and yield finely flavoured mutton. They are especially noted for their power of resisting the injurious effects of damp.

(3.) *The Dishley or New Leicester*—is a large breed, with excellent flesh and fattening readily. The wool is both long and fine. I am informed that attempts to introduce this fine breed into the eastern part of this Province have not been very successful, as it has proved too delicate in winter.

(4.) *The South-Down*.—These sheep belong originally to the chalky short pastures of the South Downs, in Sussex, and are a valuable and hardy breed. They have been successfully introduced into this Province. They are short-wooled and have more meat in proportion to offal than any of the other varieties.

(5.) *The Cheviot*—belong to the hilly districts on the borders of England and Scotland, but have been extensively spread over the whole of those countries. They have short wool of fair quality, produce excellent mutton, and are hardy. I am informed by a good authority that they have succeeded admirably in this Province, and are one of the best breeds that have been introduced. Crosses with the South-Down are said not to have been successful, but those with the Leicester have done well, diminishing however the fineness of the wool and the hardiness of the breed, but increasing its weight and tendency to fatten.

(6.) *The Merino*—is a Spanish breed, with very fine and valuable wool, but a slender carcass with little tendency to fatten. Chiefly on this latter account, this breed has fallen into disrepute in England, but is still much esteemed and cultivated, especially in some of its crosses, in the United States.

2. *Selection and Rearing of Sheep*.—Under this head, I shall give some extracts from Youatt and from the American Patent Office Reports.

"In selecting sheep, the breeder or grazier should carefully examine the nature of his land, and having attentively weighed its relative degree of fertility, and his various sources for supplying food, he may proceed to purchase that breed which, after mature consideration, he has reason to believe is best calculated for him.

In the first place therefore, though he should never suffer himself to be led into needless expense by purchasing fashionable breeds, he should be scrupulously particular in procuring the best blood of that particular breed on which he may fix,

Secondly, the nature of the land where the sheep are to be purchased should be attentively considered; for with sheep, as with cattle of any breed, when brought from a rich to an inferior soil, they will always decrease in condition and value."

The following is a description of the requisites of a good ram, quoted by Youatt from Colley on Live Stock:

"His head should be fine and small; his nostrils wide and expanded; his eyes prominent, and rather bold and daring; his ears thin; his collar full from his breast and shoulders, but tapering gradually all the way to the junction of the neck and head, which should be fine and graceful, being perfectly free from any coarse leather hanging down. The shoulders should be broad and full, which must at the same time join so closely to the collar forward, and chine backward as not to leave the least hollow in either place. The mutton upon his arm or fore-thigh must come quite to the knee; his legs upright, with a clear fine bone equally free from superfluous skin and coarse hairy wool, from the knee and hough downwards. The breast broad and well forward, which will keep his fore-legs at a proper wideness from each other. The girth or chest should be full and deep, and instead of a hollow behind the shoulders, that part, by some called the hind-flank, should be quite full; the back and loins broad, flat and straight from which the ribs must rise with a fine circular arch. The belly should be straight; the quarters long and full, with the mutton quite down to the hough, which should neither stand in nor out; his *twist* (i. e. the junction of the inside of the thighs) deep, wide and full, which, with the broad breast, will keep his fore-legs open and upright; the whole body covered with a thin pelt; and that with fine bright and soft wool." The above description applies more particularly to the Leicester breed. It is less applicable to most others.

"The purchaser should particularly ascertain that the sheep are sound; and as an assurance of this, the teeth should be white, the gums red, the breath not fetid, the eyes lively, the wool firm, and the feet cool."

"The following hints are selected from Smith's Prize Essay on the 'Management of Sheep.' For the production of male animals no plan is equal to that of breeding in a line. When using rams of the same flock, they should by no means be put together nearer than the third remove in the same line of blood. Leicesters will improve larger breeds, but if we attempt to enlarge our mountain breeds by such means, the progeny will not prosper on the hilly pastures of their dams, nor will they become profitable on the richer pastures of their sires."

The following extracts from the Patent Office Reports, show the estimation in which sheep of different breeds are held in the Northern States:—

"It may, however, be proper to say, at the outset, that, having generally pursued a course of what may be called *mixed husbandry*, wool-growing has never been a principal business with me, but rather

an item in the general account; my flock being a small one, varying from 100 to 200, and rarely exceeding the latter number. It consisted originally of grade Merinos, averaging, perhaps, about half blood.

From this original flock my present is descended, there having been no change, except such as has been effected by what I deemed a judicious course of breeding, with a view to the improvement of the general character of the flock. By keeping this object constantly in view, I flatter myself I have succeeded in making material, though perhaps not rapid, advances. The flock now consists wholly of medium-sized sheep, compact and symmetrical in form, perfectly healthy in every respect, and yielding per head an average of about four pounds of fine Merino wool, of good length of staple, uniform in quality, not overcharged with yolk, and showing in opening a good crimp and lustre.

During the first years of my experience in sheep-breeding, I made use of Saxony bucks in my flock, mostly of pure blood; but, after thorough trial, became fully convinced that, although I was producing a more valuable article of *wool*, I was not in fact increasing the real value of the flock; the improvement in the *quality* of the fleece being attended with a proportionate diminution of the *quantity*, so that, while I was enabled to obtain an advanced price per pound for a given number of fleeces, the aggregate value had in reality decreased, in consequence of the decrease in weight; I also found the animals to be less hardy—less able to withstand the great changes of our variable climate, and, consequently, much more subject to disease. A change, therefore, seemed to be necessary. This was sought to be effected by the introduction of the pure Merino blood, as distinguished from the Saxony, and for the last ten years I have used bucks of that description, to the exclusion of all others, and have reason to be well satisfied with the change.

With the Saxony sheep, the average annual loss from disease and other causes amounted to nearly ten per cent. Since the change made in the course of breeding, the average annual loss does not exceed *two* per cent., and that arising mostly from accidental causes. I have thus become convinced that, in this locality, (it being on a range of land in latitude 43°,) the Spanish or French Merino sheep is to be preferred to the Saxony, if wool-growing is expected to be made profitable. The principal benefits I have found to result from the change are the following:

1. An increase of the average weight of fleece from about 2½ to nearly 4 pounds.
2. Getting a close and compact fleece, comparatively impervious to the weather, and thus furnishing a more perfect protection to the body of the sheep from wet and cold.
3. Consequently a more firm and vigorous constitution.
4. And in consequence of the preceding, better breeders, and greater success in rearing the lambs.

The only offset to these advantages that I have yet perceived is a slight sacrifice in the *quality* of the wool.

Much discussion has been had to show which was the most profitable, whether Saxony, a cross of Merino and Saxony, Merino, or large-framed, coarse-wooled sheep, whose carcasses are suitable for mutton. The success attendant upon the growth of each kind appears to have depended upon the skill and management of the grower, and the facilities enjoyed for the sale of the wool or carcass.

Those residing near cities or large villages, or possessing easy facilities for reaching these places, may find large-framed, coarse-wooled sheep, to a *limited* extent profitable; but such is not the fact in regard to the great mass of wool growers in the United States. The profits arising from their flocks must result from the wool, or from the sale of sheep made valuable, by the skill of the breeder, for their superior fleeces.

Where the facilities for selling have been such that the intrinsic value of the fleece could be obtained, I think I am not hazarding too much by saying, that the profits arising from the growth of fine wool have been greater than on the lower grades. But where these facilities for selling have not been enjoyed, the profits have been in favour of the grower of medium and low qualities. As a proof of this, reference may be had to the fine wool grower in those sections of the country where, by reason of their superior clips and large flocks, great inducements were held out to fine wool purchasers to visit them for the purpose of buying; and thus a competition was created, which resulted in fair prices; while in other sections, where equally as fine wool was produced, but in less quantities, or where the low, medium, and high grades were grown promiscuously, those producing the fine qualities have been under the necessity of selling their fine wool at 2, or 3, or at most 5 cents only, above the price paid for the common or low grades, and that, too, when the superior condition of the fine fleece alone, independent of its quality, would make that difference: thus sustaining a loss of all their skill, care, and expense, in breeding fine instead of common or medium wools."

3. The following extracts will be of service in showing the methods considered best for managing sheep by wool-producers in the United States, and the value attached to different sorts of wool by manufacturers there.

"The condition of the animal should be uniform from the time of one shearing until the next. If this is not the case, the effect upon the wool will be injurious; for while the sheep is fattening the wool will be of a grosser growth and the fibre larger; and when it has become poor, the growth will be less vigorous and the fibre smaller; and you have this result, (which will readily be discovered by a practical eye in examining the fleece)—two qualities of wool in the same fibre. I have seen flocks which were well kept for six months after shearing, and then run down in flesh, and remained poor until next shearing, when the outer end of the staple was one full quality in fineness below the inner end; also when the animal had been well kept at the beginning and end

of the year, but poorly kept and run down in winter, the middle of the fibre showed the same difference."

"This not only reduces the quality of the wool in the stapler's scale to the lowest and coarsest grade in the fibre, but also makes the fibre weak and tender in the fine part grown when the animal was poor. The result of bad keeping, also, often injures the health of the sheep, which, in addition to the evil; spoken of, gives the wool a knotty appearance and a tightness of the fleece. When the condition of the sheep is good, and they continue vigorous and healthy during the whole year, the fibre of the fleece will be free and uniform in quality, and the fleece heavier and more valuable, than when they are altered, changing from a high to a low state of flesh. *The fineness of the fibre should be produced by the high blood of the sheep, and not by poor keeping.*"

"Before turning out to pasture in the spring, sheep should be well tagged, care being taken to remove all the locks of wool that would be likely to retain filth. Very early washing often proves injurious; and especially is this true in regard to fine-wooled sheep. It should be delayed until the warm weather has fully commenced, which is usually not until June, when the water becomes sufficiently warm to facilitate the removal of the filth from the wool. Too early washing and shearing often expose the sheep to cold storms and the chilly effects of cold nights, without the necessary covering provided by nature for them; while too late shearing exposes them to the rays of the hot burning sun before the new growth of wool has attained a sufficient length to shield them from its effects.

The manner of washing sheep must necessarily vary, for all have not equal facilities. Pools of stagnant water should be avoided. Better not wash at all than have your flocks poorly washed; for if not washed, you arrive at the value of the fleece, compared with clean wool, by a well known and established rule of discount. The best mode is to use a running stream, or vat with a stream of water, having a fall of a few feet, running into it.

Just previous to washing, the sheep should be thoroughly wet without squeezing the wool, and suffered to stand crowded together for a few hours, until the soapy substance and oil or gum which the wool contains, unite; when again taken into the water and the wool squeezed with the hands, the whole of the filth readily separates from the wool, and passes off with the running stream. In the common mode of washing, the soapy substance first passes out of the wool, only partially uniting with the oil and gum, after which it is impossible to remove the gum, no matter how much time may be spent in washing. Care should be taken to wash the fleece thoroughly in all its parts. I have seen frauds attempted to be perpetrated by washing the back and sides, and leaving the belly and skirts unwashed, which in rolling up the fleece were carefully concealed. After washing, the sheep should be suffered to run in a clean green-sward pasture a sufficient length of time for the wool to get dry, which is usually in four or five days, and then shearing

should commence. Very large flocks should be divided, and the washing done at different times, or they will run too long before being shorn. The place assigned to the flock when collected for shearing, should be well littered with straw and kept clean, so as to prevent the filth, consequent upon their being close together, from getting upon the wool. In shearing, great care should be taken to keep the fleece whole. Each clip of the shears should sever a part of the wool from the sheep, and a second clip either on that part of the animal, or on the part of the fleece just severed, should be avoided; for clippings thus made are useless, and a total loss.

After shearing, the fleece should be removed to a table, or clean smooth place on the floor, with the inner part down; then gathered up into as compact a condition as it occupied when on the sheep; the sides of the fleece should be then folded over so as to meet on the back of the fleece, the head and neck thrown back so as to make the fold upon the shoulder; it is next folded or rolled from the butt of the fleece, and continued until you reach the shoulder. The fleece should then be snugly tied with a small, smooth twine, passing around two, or at most three times. You thus have a compact fleece, easy to open, and the shoulder, which is the finest part, on the outside. Buyers always expect to see the *best side out*, and wool-growers sometimes do themselves injustice by not thus exhibiting their fleeces. I do not believe that the manufacturers, as a whole, in this country, are yet prepared to pay a sufficient advance beyond the present prices, to justify the growers of wool in removing all of the fribs, belly locks and skirts from the fleece, as is done with the fine wools of Germany. I would therefore at present put inside of the fleece all the well washed and clean wool shorn from the sheep, carefully excluding all such locks as are filthy, or below the residue of the fleece in condition.

The various sorts are known by the following designations: Super, Extra, Prime, No. 1, No. 2, No. 3, De Laine No. 3, No. 4, De Laine No. 4, No. 5, and long combing.

There are few flocks, however carefully bred, which will not embrace three or four of the above-mentioned classes—many six or even eight of them. Hence the wool grower under the old system, when disposing of his wool to a manufacturer using the lower grades, must expect that such a price only will be offered for his whole clip as the lower grades are worth; and the fine wool manufacturer will not become a purchaser unless a large proportion of the clip is of a quality suited to his purpose. It will readily be seen that these difficulties may be obviated by a judicious classification of the fleeces. The following statement will show the usual relative value of the different sorts, and the uses, in part, to which they are applied. The prices here mentioned for the finer qualities are taken from the highest range of the present year. For the lower qualities there has been an unusual demand, and prices have ranged higher. No. 5, which is the coarsest grade, and used for making coarse satinets, baizes, and the coarser kinds of heavy goods,

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25 cents; No. 4, used for low flannels, satinets, and $\frac{3}{4}$ cloths, 23 cents; No. 4 De Laine, used for a medium kind of worsted goods, 29 cents; No. 3, used for flannels, medium cassimeres and satinets, and low-priced broadcloths, 31 cents; No. 3 De Laine, used for Mousselin De Laines, and other combing purposes, 32 cents; No. 2, adapted to fine fancy cassimeres and medium broadcloths, 35 cents; No. 1, used for similar purposes, 39 cents; Prime, 44 cents; Extra, 50 cents; Super, 60 cents; another quality may be selected from the Super, called Super-super, worth 75 cents. These high grades are used for the finer qualities of cassimeres and broadcloths. The difference between Nos. 3 and 4, and the De Laines or combing qualities of the same Nos, consists in length and strength of staples, and not in the fineness of the fibre."

The general management of sheep, in relation to food, shelter, attendance, shearing, &c., is a subject so complicated, and depends so much on climate, the breed of sheep, and the purposes for which the flocks are reared, that it would be hopeless to attempt giving a connected summary of it. I may remark, however, that the position and physical character of our province lead to two very distinct kinds of sheep husbandry.

Along the southern or Atlantic coast of Nova Scotia, and in the numerous small islands in its vicinity, sheep may be kept with very little expense and trouble. In Briar Island, for instance, at the southern entrance of the Bay of Fundy, which is inhabited chiefly by fishermen, and has scarcely an acre of ploughed land on its surface, though it can boast of the neat and thriving little town of Westport, large flocks of sheep are kept. They run wild all the year, and in summer find plentiful pasture on the uninclosed surface of the Island. In winter they derive much of their subsistence from sea weed; and even in summer may often be seen scrambling along the rocky shores in search of it. They receive scarcely any attention, except at shearing time, or when required for killing. They are of course small and hardy animals, but their mutton is said to be excellent. Large portions of the southern coast of our province would support sheep in the same manner; and I have no doubt that ultimately almost the whole of these rocky coast districts will be turned into sheep farms, and that the bogs and swamps will be made to yield hay for their winter keep. There can be no doubt that in the comparatively mild climate of these districts, a fine and valuable quality of wool might be produced, suitable for exportation or for the domestic manufacture of the better class of cloths.

In the inland or more properly agricultural districts of the province, fine and large breeds of sheep may be raised, but their winter keep will be more expensive than in the shore districts, and more difficulty will be experienced in providing them with extensive and unobstructed ranges of pasturage. In these districts, as yet, sheep husbandry is generally limited to comparatively small flocks, producing mutton and wool for

domestic use only; and the latter in sufficient quantity to furnish the greater part of the outer clothing of the agricultural districts, of better and more durable material than the imported cloths. It should, however, now form a subject of consideration with farmers, whether the production of fine wool for the manufacture of the finer fabrics in this country, or for exportation to the United States or Great Britain, might not be deserving of their attention.

V. SWINE.

Perhaps no kind of live stock is more profitable, in proportion to its cost and the labour required, than swine; and it is equally important in this as in other kinds of domestic animals, to have good breeds to operate on. The following are said to be the characteristics of a good hog:

"Small muzzle; narrow forehead; large cheeks; eye quick and bright; ears short and thin; neck almost as broad as chine, and that of equal breadth nearly to the tail; belly almost touching the ground from the hind legs to the fore; thighs large, both inward and outward, and division between them large; legs small and short; feet firm and sound; bones small; joints fine; hair long and thin; few bristles; skin loose and mellow."

1. There are numerous varieties of the Hog, which are continually increasing by crossing. Probably the most important breeds are the Chinese and Berkshire, which are thus described:—

"*The Chinese Breed* is small, fine limbed, round in the carcass, thinly bristled and thin skinned. There are two varieties, the white and black; the former being better shaped than the latter, but more tender and less prolific. Both breeds are tender, susceptible of cold, and difficult to rear; yet, from their early aptitude to fatten they are in great esteem with those who rear only young porkers. If fed on farinaceous food their flesh is very delicate, but it becomes coarse and oily when offal and animal substances are given: it is not adapted for bacon, and is deficient in lean meat; and their hind quarters being small in proportion to the body, they cut up to disadvantage when intended for hams."

The great merits of this breed, are its compact form and the readiness with which it fattens on a comparatively small quantity of food. On these accounts the Chinese breed is very useful for crossing with our larger and more slender native breeds, to which it communicates in a greater or less degree its round form and tendency to fatten; though it also gives a more delicate constitution and a diminution of number in the farrows.

The Berkshire Breed is esteemed the best English variety of the hog, the only other sort which equals it in the opinion of the best

authorities, being the improved Essex breed, which appears itself to be descended from the Berkshire, and resembles it in many of its qualities. The Berkshire hog is thus described by Youatt :

“Sandy or white colour, with brown or black spots; sides broad; body thick, close and well formed; legs short; head well placed; ears large and sometimes pendant over the eyes. Another distinctive mark of this breed is that the best of them are without bristles, and the hair long and curly, and curiously feathered about the ears. The skin is thin, the flesh well flavoured and the bacon superior. Hogs of this breed have been known to reach the weight of 113 stones or 8 lbs.”

“*Lord Western's Essex Breed* are apparently descended from the Berkshire stock, and may be reckoned among the finest breeds in the country. They are black and white, short haired, fine skinned, with smaller heads and ears than the Berkshire; broad and deep in the belly, full in the hind quarters, and light in the bone and oil. The sows are good breeders, and have litters of from 8 to 12, but they have the character of being bad nurses. Lord Western describes them as feeding remarkably quick, growing fast, and being of an excellent quality of meat.”

Youatt thus sums up the comparative values of the best breeds:—

“Each of the breeds we have mentioned has its advocates; but as their respective value does not depend on soil or situation, these differences of opinion can only be ascribed to want of sufficient comparative experiments or to prejudice. A very competent, and apparently a very candid judge of the merits of the principal kinds, gives it as his decided opinion, that the Berkshire rough-haired, feather-eared, curled pigs, are superior in form and flesh to all others.”

“His opinion of the relative merits of Chinese and Berkshire pigs must have been based on fair experiments, and due consideration of their respective values; for he mentions having fattened a Chinese sow to the weight of forty stones or 14 lbs., at three and a half years old, and the quality of the bacon of each kind fatted and cured, was decided by a party of gentlemen at Lord Conyngham's table, in favor of the Berkshire. In this we unhesitatingly coincide; but we are inclined to think that the improved Essex breed may fairly compete with either, for it can be brought earlier to maturity by three or four months—it makes finer and more delicate pork, especially for pickling—good bacon and hams, and the sows are good breeders.”

2. *The Feeding of Hogs* necessarily varies in different countries. The following account of the most approved English practice cannot however fail to afford useful hints.

“With regard to sows in pig, it is obvious that they should be well fed, that they may be enabled to supply their young ones with the necessary quantity of milk; but while care is thus taken to keep them in good condition, equal caution is necessary that they do not become too fat. For those that litter in spring, tares and cabbages, with the

butter-milk and wash of the house and dairy, may be employed with advantage; or if the supply from the dairy is not adequate to the demand, a wash may be prepared with oat, barley or pea meal. For those that litter in the autumn, lettuces have been found wholesome and nutritive, in addition to the wash; and in the winter season potatoes, Swedish turnips, parsnips and other roots, previously prepared by boiling, should be added."

The *Young Pigs*, after being weaned, may be fed in the same manner as the sows; but the addition of pea soup, made by boiling a bushel and a half of peas in about sixty gallons of water, until they are thoroughly broken and dissolved, either given alone or mixed with butter-milk or whey, will very materially improve their condition. No species of food has been found more fattening than barley meal, especially when mixed with skimmed milk. It is also an excellent addition to steamed potatoes. Whatever may be the food, young pigs should be kept warm, for they will never grow or thrive well when exposed to cold. During the weaning, especial care should be taken to supply them with plenty of clean straw, and to keep the pigs as clean as possible. The want of this cannot be compensated by the most plentiful allowance of food."

In summer the *Store Pigs* may be allowed to pasture in a well enclosed field, or may be fed with green food brought to them. The latter is better where the labour can be spared. In the former case "it will be proper to have them *well ringed*, in order to prevent them from breaking into grain fields; and that operation should be performed as early as possible. Mr. Tubb recommends, instead of ringing; the paring off with a razor or sharp knife the gristles on the tips of the noses of the young pigs. The wound soon heals over, and they are thus rendered incapable of rooting in the fields"

For *Pork*, pigs are usually *fattened* from six to nine months old; for *Bacon* from nine months to a year and a half; and store swine at the same period or rarely beyond two years; the latter however is the preferable age for substantial bacon for farmer's use, and for which purpose the bacon should be made perfectly fat. For porkers, butter-milk, whey and barley-meal are preferable; for bacon hogs, equal parts of fresh pollard and pea meal have been recommended. Generally speaking, a hog in good condition, when put up and intended to be fattened to twenty score, will consume six or seven Winchester bushels of peas. They are generally given raw; but some experiments tend to show that they might be more advantageously used when boiled to the consistence of thick soup."

"Indian corn ground, barley, oat and pea meal, swedes, parsnips, mangel wurtzel, carrots, flax seed, green clover and green corn and cabbages, are some of the best and most nutritive matters that can be used in fattening swine" Roots and vegetables are more useful when cooked than raw, but pigs cannot be fully fattened on these alone. The best and firmest bacon can be made only by the use of grain and pulse for at least a considerable part of the food."

"Swine when fattening should be kept warm and clean, especially in cold and damp weather, and they should also be supplied with plenty of litter, the cost of which will be amply repaid by the increased proportion of excellent dung thereby obtained. They should also be supplied with abundance of water."

"Not only should these animals be kept warm and dry when fattening, but they should also be confined if possible by themselves; or at all events there should be as small a number in the same sty, and as much out of the hearing of the cry or grunt of other pigs as practicable."

"A practice has been introduced in the county of Essex, though not yet generally followed, of fattening pigs in separate stalls. These are so constructed as to admit of only one pig each, and just allowing him room for him to lie down, but not to turn. They are built with the floor in a sloping direction, to carry off the filth. The food given is usually barley and pea meal, and water or whey, and they are said to fatten far better in these styes than in the common ones; this is attributed to their being more quiet and having only to eat and sleep. Instances have been known in which a hog half fat when put into one of these cages, has gained fifteen pounds a week in flesh."

"Regularity in feeding should likewise be especially regarded, as it has great influence in facilitating or retarding the fattening of swine; hence it will be proper to give them a full allowance of food three or four times, or at certain other stated intervals in the day, as convenience or other circumstances may allow. If any animal should have surfeited itself by eating too large a proportion of food, it will be advisable to administer half an ounce of sulphur in some wash, once or twice in the course of the day, and on two or three successive days."

"In *buying and selling swine*, both in a fat and lean state, it has been calculated that every twenty pounds of live weight will, when killed, produce from twelve to fourteen, the advantage being in favour of large hogs; so that if a farmer or breeder weighs the animals when alive, he will be enabled to calculate the net profitable weight when dead. By weighing the hogs every week, he may also judge of the best time for selling them to advantage; for as soon as an animal ceases to acquire that daily increase which makes it beneficial to feed him, the best step that can be taken is to sell or slaughter him without farther delay."

It may be interesting to farmers to know something of the methods by which the immense quantities of pork annually exported from the Western States, are produced. I therefore give the following extracts from the last Washington Patent Office Report. The two first extracts refer to the State of New York; the others to Ohio and Indiana, the head-quarters of cheap Western pork.

"I still hold to the Berkshires as the best; the cheapest are those produced from the dairy refuse, finished off with the soft corn."

"With us along the Hudson River, who cannot compete with the West in producing heavy pork, where grain is cheap, there is a preference for a breed of hogs that mature young. Our cheapest method of making pork is by feeding sour milk, apples, roots, bran, etc.; pork made by feeding grain is less profitable."

"We can boast of being able to produce pork as cheap as can be done almost anywhere. The grazer, from his disposition to fatten at any age, has the preference. The cheapest method of producing pork is to graze all hogs, six months old and upward, from May till July on clover, without grain of any kind; then put them on rye six weeks or two months after which they will require but little feeding till ready for market. Spring hogs are frequently put into heavy market; but this needs closer attention and more grain, as it requires also a plentiful supply of rich soil all the time. Older hogs thrive better, and yield a better profit from fall feeding, if grazed in summer."

"Best breeds, Bedford, China, Byfield, Russia, and Sussex; all have their admirers. The cheapest method of making pork is to give the pig the run of clover and stubble fields, and of the fruit orchard that abounds in the very best sweet apples, peaches, etc., until he has nearly attained his growth; then put him up in a close pen and feed on corn meal. If cooked or fermented, all the better. Pork for bacon should be well rubbed all over with salt, and packed in bulk; coarse salt is best; a small portion of saltpetre should be added. After lying two weeks it should be overhauled, again rubbed with salt, and repacked. At the expiration of five weeks after first packing, provided the pork is not large, wash clean, hang up, and before the surface is quite dry, completely saturate the whole volume of air in the smoke-house with quicklime. This may be done by violently stirring or throwing very fine dry lime in the smoke-house. This will effectually prevent injury from skippers, bugs, etc. Smoke well with sound hickory wood. Let your bacon hang as long as you please."

"In regard to the question—how many pounds of meat one hundred pounds of corn will make—it has been well tested that twenty-five bushels of corn will, with three months' pasture of clover, make two hundred and fifty pounds of pork."

Where labor is so scarce as often not to be had for love or money, the following is believed to be the cheapest method of making pork, and is generally adopted:—Pigs that come through the season are fed through the winter on corn in the ear, and about the first of March are turned on clover. If rye and oats are raised for them they are turned into a rye field when the corn is in the dough state. From that time they go on oats, and, if the corn be ripe enough, they go on corn in the field when the oats are done; if not they are fed with corn in the field or turned again on clover. Those who do not raise rye and oats allow their hogs to remain on the clover till new corn comes in; if they have old corn to begin to feed with a few weeks earlier. If they have gathered and fed to hogs, they should always be fed on a clover field

designated for corn next year, and the manure and clover turned under soon after the hogs are taken off. Thus the crop of corn taken from one year may be made to reproduce itself the next year on another. This is believed to be the cheapest mode of raising pork. It requires less labor, and is less exhausting to the soil; nothing being taken from it but the live weight of the hogs driven to market.

The following is quite a curiosity in its way, as an illustration of the rough and wasteful modes of feeding practised in the West:—

In this county, where land and corn are cheap, and labor high, as cheap a mode of producing pork as could be pursued, would be as follows: Have your pigs come in April, or as soon thereafter as possible. Let the sows have the range of the clover field, and corn enough to keep them in condition while suckling. Feed the weaned pigs on some corn to keep them growing; young pigs do not thrive well on clover alone; they must be wintered, too, on corn. The next season, if they have been kept thriving through the winter, they will continue to do so during spring on clover alone. Take them off before it goes to seed, else they will slobber. Have a field of ripe oats or rye for them to run on when called off the clover; it should keep them a month, by which time corn will be in roasting-ear; cut up and feed them what they will eat; they will eat the ear and much of the stalk, and the balance they will chew, so as to extract its juice; as much is realized from corn at this as at any subsequent time. When corn is hard in September, have a field to turn them on. In dry weather the waste will not pay for the gathering, and of this your stock hogs, turned in afterward, will save much. In wet weather the plan cannot be followed; that which is trampled in the ground will spoil. The corn must, therefore, be gathered and fed while the ground remains soft. This, however, is not generally done; once turned on, they are suffered to remain. When the hogs have gathered the fields, they should be penned near running water, and fed what corn they will eat. They will come into an early market, weighing 250 pounds and upwards."

The secret of the immense production of western pork, seems to be the cheapness of Indian corn, occasioned by its easy cultivation and the distance from markets. If, as some of these writers seem to say, green corn, in the roasting state, is as valuable to hogs as when ripe, corn might be profitably cultivated as food for fattening hogs, even in those parts of this province where its ripening is very uncertain.

3. The following hints on *pig sties* and *troughs* are from Stephens: "Piggeries or pig sties are of three kinds: 1. Those for a brood sow, with a litter of young pigs. This kind should have two apartments—one for the sow and litter to sleep in, covered with a roof, and entered by an opening; the other an open court, in which the feeding trough is placed. For a breeding-sty, each apartment should not be less than six feet square. 2. Those for feeding pigs. These should also have two apartments—one with litter for sleeping in, covered with

a roof, and entered by an opening; the other an open court, with troughs for food. A sty of four feet square in each apartment will accommodate two feeding-pigs of 20 stones each. These sties may each have a roof of its own, or a number of them may have a roof in common. The latter is the more convenient form for cleaning out and inspecting the internal condition of the sties and the state of the pigs.

3. The third kind of sty is for the accommodation of young pigs, when they are confined, to receive better treatment than the older ones. It should have a shed, and court of from 20 to 25 feet square."

"As swine have very powerful necks, and are apt to push open doors of common construction, the sty should have a heavy door, sliding up and down in grooves. This may be so secured as to elude the ingenuity of the most cunning old brood sow to discover a mode of escape."

Stephens describes a very ingenious iron feeding trough, manufactured by the Shotts iron company, Scotland. It may easily be imitated in wood; and indeed Stephens mentions that the original construction of these troughs was in that material. It consists of a trough of the ordinary form, placed in an opening in the wall of the sty, and divided by partitions, with as many stalls as there are pigs to be fed. Over the front edge of the trough is a swinging door, hinged at top, and secured by a bolt. This prevents the escape of the pigs; and when the troughs are to be filled, the bolt is drawn and the swinging door is pushed back till it is opposite the inner edge of the trough, where it can also be secured by the bolt. The feeder can thus clean and replenish the troughs without interruption from the pigs; and when finished, by drawing back the door to its original place, the animals at once have access to their food. A figure of this kind of trough will be found in Stephens' Farmer's Guide.

4. *The curing of Pork* is not in this country usually managed by the farmer, but generally by the merchant, who purchases and cures on a large scale. The manufacture of *bacon*, and other more carefully cured kinds of pork for family use as well as exportation, merits, however, much more attention than it has hitherto received. For this reason, the following selections, shewing the most approved English practice, are introduced here:—

"In Yorkshire, the following is the practice adopted: After the pig has been killed, it is hung up for four and twenty hours; it is then cut up, and a mixture, composed of about a pound of saltpetre and two stones of common salt well rubbed into the flitches and hams, which are then laid in a pickling tub. Here they remain a fortnight, and are then turned, and about half a stone more salt well rubbed in. They are again left for another fortnight, after the expiration of which time they are taken out and hung up in the kitchen to dry, a process which takes about two months. When dry, the inner side is washed over with quick lime to preserve the meat from being injured by the fly, and they are stored up for use in a dry, cool chamber."

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"Westmoreland hams are prepared in the following way: First they were thoroughly rubbed, usually with bay salt alone; after which they were, by some curers, covered closely up, while others left them on a stone bench for the purpose of draining off the brine. At the expiration of three or four days this rubbing was repeated, but the salt was mixed with about an ounce of saltpetre to each ham. They were next suffered to lie for about a week either in hogsheads among the brine or on stone benches, after which they were hung up in the chimney to dry. In this last part of the process there is a difference in practice. By some they are suspended so that they will be dried solely by the heat arising from the fire, and without being exposed to the smoke, whether this arises from coals or peat. If not previously sold, they are suffered to continue there until the weather becomes warm, when they are packed in straw or oat chaff, and sent to their respective places of sale."

"In Spain and Portugal, where the hams are remarkably fine-flavored, a large quantity of sugar is used with the saltpetre in curing them. This materially assists in the preservation of the flesh, and renders it peculiarly mellow."

VI. POULTRY.

1. *The Domestic Fowl.*

The most important and useful kinds of domestic fowls are the following:—

(1.) *The Common or Barn-door Fowl*, which is too well known to require description. "When fowls of the common kind are white, they are said to be less healthy than the others, and the hens are seldom good layers. White chickens should therefore be fattened for the table, particularly as the colour of their skin is much better than that of the darker kinds, and their flesh more delicate. The legs of the common fowls should be short, white and shining, and their bodies round and plump." A very fine variety of the common fowl is the "Bolton grey," known in some parts of the United States as the "Creole fowl." They are "small sized, short in the leg, and plump in the make. The colour is pure white in the cappel of the neck; the body white, thickly spotted with bright black, sometimes running into a grizzle, with one or more black bars at the extremity of the tail; they are chiefly esteemed as very constant layers, though their colour would mark them as good table food." I have seen specimens of this fowl in the possession of Mr. A. Downes, Halifax, who confirms the above statement as to their great excellence as layers.

(2.) *The Game Fowl.* "The plumage of game fowls is rich and beautiful, particularly the red, and though their size is somewhat less

than that of the common fowl, the symmetry and delicacy of their limbs may be compared with those of the race horse or deer. Their flesh is beautifully white, and superior to that of all other kinds of fowl for richness and flavour; but their propensity to fight is so strong, even when chickens, that they often injure or even kill one another, and hence it is difficult to raise them in numbers. The eggs are small in size, but, like the flesh, are much esteemed for superior delicacy.

When lately in Halifax, I saw some fine specimens of the game fowls in the possession of Mr. Wills, a veteran poultry fancier, who has paid great attention to this breed. He stated to me that they are remarkably hardy, and well worthy of attention on this account, as well as the superior flavour of their flesh and eggs. He had also found that the common fowl is very much improved by crossing with this variety; a game cock introduced into a flock of any of the common varieties of hens being the means of improving their produce both in quantity and quality. The pugnacious propensities of the game fowls are troublesome in rearing them, but are best treated by allowing the chickens to take their own way until they have finally settled the question of supremacy, when their conflicts cease. Some of the fowls of this breed shewn to me by Mr. Wills, were patterns of symmetry of form, and probably nearer to the original perfection of type in the species than any other of the improved varieties. Their weight was from 5 to 6 lbs.

(3.) *The Dorking Fowls* are distinguished by having five toes instead of four on each foot. Their flesh is extremely white, succulent and delicate; and they have the advantage of feeding rapidly, and growing to a very large size when properly managed. The most common variety is white, but there are others with spotted, speckled and bluish-grey plumage. The speckled Dorkings are subject to disease of the lungs, and sometimes pine away without any apparent cause, just when they are attaining maturity. The hens are neither good layers nor good mothers, frequently trampling their chickens to death. The eggs are large, pure white, very much rounded and nearly equal in size at each end. This peculiarity in shape is also observable in the eggs of the common white Dorking fowls. The Dorking is perhaps the most profitable of all the breeds, for rearing for the table. It attains to weights of 8 to 12 lbs.

(4.) *The Malay Fowls* have remarkably long legs and large bones. Their flesh is however well flavoured when properly fattened, and their eggs are large, yellowish and very rich. These fowls are taller and stronger than most others, and their colour is black or dark brown with yellowish streaks. They are said to be bad sitters, but this is not always the case. The Malay fowls appear to be too tender for this climate.

(5.) *The Spanish Fowls* have black plumage, with a greenish metallic lustre—combs large but not brilliant scarlet, and generally on one side—a white fleshy substance on the cheek, larger in the male than the female. The Spanish fowls are large and stately birds.

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excellent for the table, and lay a great number of eggs, which are remarkable for their size and flavour. They are bad sitters, and seldom wish to sit; but if well fed and kept warm, will lay every day for the greater part of the year. They are easily injured by cold, and the chickens are a long time before they attain their complete plumage. Some varieties of these fowls have double combs, and top knots or tufts of feathers under their chips. Others have the plumage grey, speckled or white, or black with a white spot on the breast.

Some specimens of the most improved breed of the Spanish fowls, have recently been imported by His Excellency from Great Britain, and are superior in size and symmetry of form, to the individuals of this variety previously introduced into this Province from the United States.

Mr. Downes has some fowls which he names the *Algerine*, and which appear to be allied to the Spanish. They are remarkable for their excellence as layers, but are of small size. They very early arrive at maturity.

The Spanish fowls are said to attain to the weight of from 8 to 12 lbs.

(6.) *The Shanghai or Cochín China Fowls*.—The first is the proper name of these birds, the true Cochín China being a smaller and more elegant shaped fowl. The Shanghai fowls are very large, sometimes weighing fifteen pounds, and clumsy in their form. Their colour is ginger brown, sometimes with a blackish mark on the breast. Some varieties however are white or black, and a white variety with feathered legs is much esteemed. The flesh of these fowls is very delicate, and the eggs, which are not large, are of a pale chocolate colour, and of excellent flavour. Fine specimens of the white Shanghai or Brahma poutra have recently been imported by Mr. Downes.

The Shanghai hen sometimes weighs 10 lbs., and the cock as much as 12 to 14 lbs. The hens have been known to lay five eggs in two days.—*Dickson*.

(7.) *The Poland Fowls* are elegantly formed birds, with a tufted crest, while the comb is small and in front. There are many varieties in colour, some of which are much esteemed by the curious. The Poland fowls are remarkably good for the table, and produce very large finely flavoured eggs, but they are bad sitters.*

The above are the principal varieties of useful fowls, deserving of attention on account of their value for the table or as layers. There are however many other sorts, as the Lark-crested, the Hamburgh, the Bantam, the Dwarf, the Runikin, the Frizzled, the Silky, the Negro, the Russian, and the Barbary, as well as innumerable intermediate kinds produced by crossing, affording abundant scope to the tastes of fowl-fanciers, and many of them no doubt capable of being profitably reared.

Persons who rear poultry for profit, will not find it desirable to con-

* Dickson and Moubay, on Poultry.

fine themselves to one breed. Crosses between the best imported breeds and the best specimens of the ordinary fowls, as well as among the imported breeds themselves, will often be found more profitable. It is not generally desirable to attempt crosses between breeds that are very dissimilar in form and qualities; but on the other hand, continual breeding in and in tends to degeneracy. Crosses between the Shanghai and Dorking, and Shanghai and Game, are reputed to have been very successful.

Poultry Yard and Sheds.—The following facts on this subject are extracted from Youatt :

“Where a considerable number of fowls are kept, a poultry house, however small and simple it may be, should be devoted to their use. In a farm establishment this is particularly necessary, otherwise the owner will suffer materially, as they will often wander away and be killed, and the eggs will be laid in all kinds of places. This building, although well ventilated, should be warm and comfortable, and so contrived as to receive the sun's rays, during the greater part of the day. Few animals suffer more from cold than our domestic fowls. The roosting places should be easy of access to the poultry, but sufficiently high to be out of the reach of vermin, and they should consist of one or more long level ranges. The boxes for laying and sitting should be convenient and warm, apart from each other, and sufficiently numerous. If there is sufficient space, a yard should be fenced in, communicating with the poultry house, and in which the whole stock may occasionally be confined. It should contain a stream or pond or troughs of water, and be divided into compartments, so that the different sorts should not become intermingled. At all events if the poultry wander about the yard, or the barn-door or other parts of the premises during the day, their roosting and laying and sitting place should be comfortable and closed at night, and there they should always be fed. The poultry yard should be dry; there should be sheds for refuge in wet weather; and sand, chalk and lime rubbish should be strewed in it, in which they may roll themselves, and from which they may obtain lime for the shells of their eggs.”

In this country a good hen-house may be made by boarding and shingling the outside, ceiling the inside with rough boards, and filling in the space with eel-grass or tan-bark. It should be in a sunny sheltered place, with the door and a window on the south side. To keep the feet of the fowls warm in winter, some persons wrap pieces of carpet round the roosting poles. The new breeds of fowls are more tender than the native ones; and near towns it might pay to warm houses for them by stoves. Some persons who do not go to this expense, carry in every morning in frosty weather a box of warm ashes, to warm the air of the hen-house, and enable the fowls to dust themselves. Any cheap expedient that tends to secure uniform warmth in the hen-house, will be found to promote laying in winter; but smoke

and all noxious vapours and odours, whether arising from fires or animals, should be carefully avoided.

Choice of Poultry.—Youatt says:—

“As soon as it is determined to have a poultry yard, the breed or breeds should be determined on—for some must be chosen as sitters and others in order to supply the nests and the table with eggs: great care should be taken in the selection of the fowls, for on their healthiness success will chiefly depend. The signs of health are as evident and as certain in the feathered biped as in the quadruped. The glossiness and smoothness of the feathers—the brightness of the eye—the cleanness of the nostrils—the florid redness of the comb—the soundness of the legs—and the shortness of the claws—will be sufficient pledges of health. The male should be large of his kind, and bold and active. The hen should be gentle and tame, and by no means above the middle size. A small comb on the hen may be pardoned, but should not be chosen. A large comb is a frequent pledge of her unquietness, and rarely belongs to a good sitter or a careful nurse. Yellow legs are to be avoided, for there is a prejudice against them, and not altogether without cause. They are often connected with a delicate constitution, and with coarse and tasteless flesh. The fowls should be of a middle age, between eighteen months and two years. Before that period the eggs will not have attained their full size, and the young birds will be proportionably small. The first inhabitants of the fowl yard who will give to it its future character, should not be bought from a stranger, but there should be a certainty that the hens are good and early layers, and that they begin to lay again as soon as their brood is disposed of. The best period for commencing the business of the poultry yard, is the latter part of winter or beginning of spring.”

Food of Poultry.—“Hens when laying require access to lime, in the forms of chalk, burned oyster shells, marl, broken plaster, or crushed egg-shells. They also at all times need small stones or sand to aid the process of digestion.”

“Poultry,” says Dickson, “are fond of all sorts of grain. They also eat most sorts of green vegetables, such as lettuce, spinach and cabbages, both raw and boiled, but this sort of food should be used only as an adjunct to grain. Most sorts of animal food they are also fond of, both raw and cooked. Insects also, and worms and snails, they search for with avidity; and some will eat slugs, but of these they are not usually fond, and many fowls will not touch them. It is recommended by some works to feed fowls on refuse corn, but this is quite a mistake; as though young fowls may be fed on offal, it is the best economy both for fattening and laying, to give fowls the finest kind of grain. Fowls may be fattened either (1) by having the run of the farm-yard with occasional feeds; and in this way the finest and most delicate flesh is produced, or (2) by taking them up and confining them

in coops for a few weeks before killing: this seldom succeeds well with fowls accustomed to liberty, or (3) by accustoming them to confinement from an early age, and providing them with a roomy and clean feeding house, with plenty of food, water and gravel, and perches for those that choose to perch, as well as straw for those that prefer lying in it to perching."

"When chickens are put up for fattening, it should be as soon as they have quitted the hens, as they are then usually in fine condition and full of flesh, which they lose as their bones develop and become stronger, particularly in those fowls which stand high on the leg. In the choice of full sized fowls for feeding the short-legged and early-hatched always deserve a preference; the best mode of keeping poultry is to let them have constant high keep from the beginning, when they will not only be always ready for the table with very little extra attention, but their flesh will be superior in juiciness and flavour to those which are fattened from a low and emaciated state. Pullets which have been hatched in March, if constantly high fed, will lay plentifully through the following autumn, and may be fattened for table in February."

"Instead of giving ordinary or tail corn to my fattening and breeding poultry," says Mowbray, "I have found it most advantageous to allow the heaviest and the best; thus putting the confined fowls on a level with those fed at the barn yard, where they are sure to get their share of the weightiest and finest grain. This high feeding shows itself not only in the size and flesh of the fowls, but in the size, weight and substantial goodness of their eggs, which in these valuable particulars will be found far superior to those of fowls fed upon ordinary grain or washy potatoes: two eggs of the former going farther in domestic use than three of the latter. The water given to fowls should often be renewed, and kept fresh and clean, indeed fowls that have been well kept will turn with disgust from ordinary food or dirty water."

The following summary of the value and effects of food of different sorts, is selected from Dickson and Mowbray:—

Grain of all kinds occupies the first place. Nearly the same measure of oats, buckwheat or barley, will be found sufficient for a fowl per day. A fourth part less of wheat will suffice, and still less of Indian corn or rye. The tastes of fowls, however, differ somewhat, and they will ordinarily consume more and thrive better where they have a choice of food. Most fowls prefer *boiled grain* to that which is dry; and in the case of Indian corn and barley, there is a considerable saving by boiling the food, but this does not appear to be the case with other grains.

Bran and Pollard mixed into a paste with water, are good food; but fowls require about twice as much as they do of dry grain.

Peas and Beans are good food, and as nutritious as grain. They are better boiled than raw.

Potatoes are useful, along with grain, but should always be boiled and given to the fowls warm.

Carrots, Turnips, Parsnips, &c., when boiled may be given as an evening meal when grain has been given in the morning, or they may be cut into small pieces and mixed with bran or oatmeal.

Green Food and kitchen scrap may form a considerable part of the subsistence of fowls; crumbs of bread, fragments of puddings, &c., are of course about equal to grain: parings and portions of green vegetables are useful as a variety, but not good as a staple article of diet. Every scrap of meat or fish, and bones with pickings on them, will be found acceptable to poultry, and will promote their laying. Fat is also much relished, but if given in large quantity renders them too fat to continue to lay.

Laying and Hatching.—"There seem to be naturally two periods of the year when fowls lay—early in spring, and afterwards in summer; indicating that fowls, if left to themselves, would, like several wild birds, produce two broods in a year. In warmer climates, young, healthy fowls most usually begin to lay in February, but cold retards the process in colder climates, and the knowledge of this fact has been taken advantage of to anticipate the natural period. Some hens will lay only one egg in three days—some every other day, and others every day. It is told of some ancient varieties, as well as of the Cochon China and other modern kinds, that they have been known to lay three eggs in one day."

"The eggs ought to be taken from the nest every afternoon when no more can be expected to be laid; for if left in the nest, the heat of the hen, when laying next day, will tend to corrupt them."

"The laying of hens continues, with few interruptions, till the end of summer, when the natural process of moulting puts a stop to it, because all the abundant nutriment is required for the growth of new feathers, and the cold weather which succeeds prolongs this period of rest. Each successive year the period of moulting is later, and consequently the older the hen is the later in spring does she begin to lay."

"The period of commencing to lay," says Youatt, "may be hastened by a portion of buckwheat, hemp seed or barley given with the usual food. This object, however, being accomplished, all stimulating food is to be removed; for a laying hen must not be too liberally fed. Too plentiful as well as too little food will almost equally lessen the number of eggs."

"The most efficacious way," according to Dickson, "of promoting laying is to keep the hens warm, as we know that a severe frost will suddenly stop the laying of even the most prolific hens." Another mode is—as pullets commence laying before older hens, and do not moult the first year—to have an early summer brood hatched in April or May, which will begin to lay about Christmas; in fact, by attending to the period of hatching, hens may be got to lay all the year. A friend informs us that a neighbour of his in this way has a brood of chickens.

*Dickson.

soon after Christmas, which, by being carefully sheltered from cold and wet, and fed once a day on boiled potatoes, hot, begin to lay early in the ensuing winter."

Youatt gives the following directions in reference to sitting hens:—
 "Towards the beginning of March many of the hens will show a disposition to sit. Fresh nests should be prepared, composed internally of short and soft materials in a frame of wood and level with the ground, or, which is better, about three or four inches from the ground, and the ascent to them very gradual. The hen or hens that are intended to sit should be carefully selected. The eggs that are to be placed under the hens should have the date of their being laid marked upon them; and, varying with the size of the hen and of the eggs, a proper number should be selected that were laid within a day or two of each other. A small hen, if the eggs belong to a small breed, will cover from eight to ten eggs; a large hen may manage twelve or fourteen. These should all be marked, and advantage taken of the occasional absence of the hen to see whether any others have been added. If there are more than the proper number, the unmarked ones should be removed. Proper and sufficient food should be placed near the hens, that they may not be too long absent from their charge. Hunger alone will induce them to leave it for a moment."

"No interference should be permitted during the whole of the incubation, unless at the close of it the chicken should not be able to free himself from the glutinous substance that lines the inside of the egg; nor should any of the chickens be taken away as they are hatched, for this will only disturb the hen and the others. She should be left quite alone, till she comes chuckling from her nest with all her little ones about her."

"The proprietor may not wish to have too many broods of chickens running about at the same time. If there is not more than a day or two difference in their age, he can select the last that hatched her chickens, or he can take the most careful and best mother, and give her the whole of the broods. If the other hens are then placed at a distance, they will give over chuckling in the course of a day or two, and begin to lay eggs again."

"The best food for newly hatched chickens is shelled oats boiled for a minute or two; to this may be added a little hard-boiled egg or crumbs of bread. The mother will provide them with plenty of insects and other food. Every one who has much to do with poultry should have a brood-basket, in which he can carry the hen and her chickens to different parts of the yard or farm. The wicker-work will allow the chickens to go out, and they will pursue and pick up all the larvæ, insects, and other creatures, destructive to the crop. When one space is cleared, the basket may be moved, until the greater part of the field is gone over. After about a week, the hen may be suffered to run about with her brood. Her health will be improved by this. She will teach them the most suitable kinds of food; and by her habit of scratching she will procure them much that would otherwise be lost."

"For chickens that are intended to be fattened, the grain, during the first week or perhaps longer, should be steeped in water or boiled for a few minutes. The hot liquor may be thickened with oat or barley meal to a firm or almost solid state. Pea meal or boiled potatoes, given warm, and light corn, or almost any food of this kind which is most convenient to the owner, and which does not excite purging, may be substituted. In the course of ten or twelve weeks the chickens will have become sufficiently grown to send to market."

The following practical directions for breeding fowls, are extracted from Bennett's poultry book:—

"When the object in view is to perpetuate distinct varieties of uncontaminated blood, the first requisite is to procure fowls known to be of pure blood, and possessing all the necessary characteristics of their kind. Labour is lost unless the fowl selected is a perfect specimen of his variety, for whatever imperfection exists is likely to be perpetuated in the progeny. Regard should be had to plumage, to size, and to form, in making a selection either of a cock or of a pullet, and those are preferable which are hatched earliest in the year. The age of the fowls is a matter of considerable importance: and though it is true that a fowl will lay the greatest number of eggs in her first year, yet it is believed that the chickens which are hatched from the second year's eggs are more vigorous and healthy. Old hens are preferred to pullets generally as sitters, on account of their more sedate and matronly character. A young cock, though more active in his earliest days, and likely to bestow his attentions on the hens with less reserve, is not, however, best for use in keeping a breed. The eggs impregnated by him after his first year are likely to produce the strongest chickens. It is an error to suppose that his pro-creative power is decayed or vitiated, as is often represented, after three or four years. On the contrary, a healthy, vigorous cock, if not allowed to walk with *too many* hens, may be valuable and useful in the poultry yard for a longer time.

An error is often committed by giving too many hens to one cock, and the result is a weak and otherwise deteriorated progeny. *Not more than five hens* should ever be allowed to associate with a single cock where the quality of a breed is a matter of interest. Three would be the better limit of restriction, but five is the furthest limit which can be safely assigned."

"Most persons in obtaining a single vigorous cock and hen of a desirable variety, find their anticipations more than realised in the production of a fine progeny. The plumage is brilliant, and the chickens are of increased size and remarkably strong and healthy. This happy state of things continues so long as the cock is restricted to a small number of hens. So soon, however, as his harem is enlarged, different effects are manifested, and a deterioration in the stock is clearly observable. This is not to be attributed to close breeding, but to the increased proportion of females to the male."

2. *The Turkey.*

"There are various breeds of turkeys, the best and, most hardy of which is, the black Norfolk. The varieties of copper colours never attain to the size of the Norfolks. The white turkeys have the character, and truly so, of not being sufficiently hardy."

"As soon as the laying season commences, the males may, with advantage, be separated from the females. The hen will perhaps endeavour to build her nest in some inconvenient place, and with improper materials; it will therefore be proper to watch her, and to remedy this. She will generally lay more eggs than she can cover. About a dozen is a proper number for her. Each turkey hen ought to rear at least ten at the first hatching and about half a dozen at every subsequent time. The period of incubation is twenty-eight days, or sometimes one or two more. Until she has hatched her young ones, she is a good mother, and will half starve herself on her nest, therefore she should always have food, water and sand, within her reach."

"The young birds are very tender, and should be left under the care of the mother until the whole hatching is completed. During the first month they require much nursing, and should be protected from the inclemency of the weather. Their food should be nutritious and varied: oat and barley meal, moistened and beaten into a mass, bread sopped in water, well-boiled eggs, malt, meal, &c. These articles should be alternated or mixed together; the principle is, that there should be a frequent change of food. After the first three weeks the food may be a little more stimulating, and bruised peppercorns, should be added, or caraway seeds. The first should be given in preference, and the two will, for general purposes, supersede every other kind of spicy food. The state of the brood should be often inspected, and if any of the young ones are drooping, or refuse to feed, or are pen-feathered, a few additional peppercorns may be added, with pills composed of garlic and rice, which must be forced upon them. Small bits of lean meat may also be thrown to them. They may have free access to water, but the food that is given to them should be beaten together into as solid a form as possible."

"When two or three weeks are passed, if the brood is doing well, the food in which they will be afterwards kept may be given in small quantities as buckwheat and other kinds of grain and vegetables, etc., the mixed meals being still continued. They may now wander farther from their coops by degrees extending their range until they have become independent of the hen. They will then perhaps be rarely seen at home, except perhaps to receive their regular food at morning and evening."

"When the bird is nearly full grown, there will then be little trouble in getting him into good condition, by the use of plain and wholesome food; and the flesh will then possess the best flavour. If there is a necessity for greater haste, or if it is wished to accumulate more fat,

the spices already referred to may be given in the food, with the occasional addition of an onion, of which the bird seems to be naturally fond. If there is a decided objection to anything as a frequent or common food it is to milk, which has a strange tendency to become quickly sour in the pouch of the turkey."

"Marrow-fat peas, and most sorts of pulse, are also said to be injurious to the turkey."

"The turkey prefers dry soils, and high and airy roosting places."

"The eggs ought to be taken from the nest every morning as soon as laid, and kept in a basket in a cool, dry place, till the hen leaves off laying, when none of them will be too old to set for hatching. When turkey hens have been left to themselves during laying, and have chosen a nest at a small distance from the house, there is hardly anything to be done, for they will leave it with difficulty, and they generally hatch their brood safely, and the young ones are the stronger for it."

"The timidity of turkey hens when sitting, makes it indispensable that no one approach them, except the person who usually gives them meat and drink. Nothing thwarts and disturbs the hens more than to meddle with their half-hatched eggs."

"The hot sun and the rain are equally injurious to young turkey chicks. They may however be exposed to the moderate warmth of the sun for a short time each day. They should not be handled and handled when very young, but are better left to the care of their mother until they naturally begin to peck."

"No food makes the flesh of young turkeys more white and delicate than kitchen stuff."

3. *The Duck.*

There are several varieties of the tame Duck. The dark coloured Rouet-Duck is most in request. The English or Aylesbury white is large, but inferior in flavour. It is usual to have one male to every four or five females. They should be carefully selected, with regard to their being prolific, attentive to their young little addicted to wandering, fattening kindly, and their flesh being of good flavour. Different breeds should not be mixed together.

"Some attention should be paid to their nests, for they are apt to be careless in the beginning of their laying. The eggs should be regularly collected and marked with the day on which they were dropped. When there is more than one duck anxious to sit, the eggs should be selected according to the time when they were produced. A brood duck will generally manage about a dozen eggs. They should always have food and water near them, that they may not be taken away too far, or kept too long from their nests."

"The ducklings should remain with the mother a few days or a week, being kept on nearly the same food as the young chickens, with plenty

* Extracted principally from Youatt and Dickson.

of water in shallow pans or troughs. In a few days the coop under which the mother is confined, may be moved to a sheltered sunny spot, where there is plenty of grass; and shifted every day. In the course of a fortnight the ducklings may be permitted to go with the mother to a pond; but the day should be fine and the weather warm, and they should be suffered to remain out only a little while at first, lest they should be cramped or scoured."

The practice of raising ducks under hens, is a cruel and unprofitable one. It rarely comes to good."

In six weeks or two months the owner may think of turning some of the ducklings to profitable account. He increases the morning and evening meal gives them more grain, or some kind of culinary vegetables. He varies the food continually. This is a golden rule, that should never be forgotten. He mixes up the meal or grain with any waste animal fluid. The ducklings are thus kept in a state of unnatural fattening. This is dangerous, but it is necessary, for otherwise they would not attain the condition that is indispensable to their sale, or the peculiar flavour in which the epicure delights."

"The fattening of the full-grown duck is another business. He is taken from the corn-field and the pond. He is confined in a somewhat darkened place. His food is placed immediately before him, and under the combined influence of these processes he rapidly gets fat."

4. *The Goose.*

"A mixture of different breeds is far from unusual or improper in the rearing of geese. The large white gander and dark grey goose will suit best. An important object with the breeder of geese, is to have if possible two broods in one season. In order to effect this, he feeds his breeding stock well towards the close of the winter months, and particularly as the laying season approaches. He will know when that is at hand, by the goose beginning to carry straw in her mouth. He must immediately provide her with a nest in the hatching house or some other convenient place, and she will then begin to lay her eggs. Ten or twelve eggs will be as much as she can manage to cover, and the rest should be removed. Her time of incubation is thirty days, during which she should be fed chiefly on oats, and a little boiled potato rubbed fine given to her every three or four days."

"The goslings should remain with the goose, the entrance of vermin of every kind being prevented, and should be supplied with the kind of food recommended for the ducklings and other young fowls. Fresh water, sand and a clod of grass, or turf, are among the indispensable things. Having become a little strong and not so liable to be attacked with cramp, etc., which will be the case in a week or less; they may be turned with the goose into a plot of short grass. This may be continued until they are strong enough to be turned out with the other geese."

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"The after history of the gosling and goose varies but little from that of the duckling and duck; the same full allowance of food is required, and the same week or fortnight's extra feeding before they are sent to market. Boiled potatoes and oats given warm, will tend to fatten geese into fair condition."

"All men," says Markham, "must understand that except he have pond or stream, he can never keep geese well."

"All damp must be avoided in houses for geese, for they are at all times fond of clean, dry places to sleep in, however much they may like to swim in water."

"It is not good to keep geese with other poultry, for when confined in the poultry-yard they become very pugnacious, and will very much harass the hens and turkeys."

"Grass, the refuse of vegetables, occasional meals of potatoes and grain, with the range of stubble fields in autumn," furnish cheap means of keeping geese in this country, but attention to fattening them by regular and abundant food before killing, would much improve their quality and enable them to realize a higher price. It must be admitted however that geese of good quality are usually much more abundant in the markets and Agricultural Exhibitions of this Province than are superior specimens of the other kinds of poultry.

The *Wild Goose* of this Province, or the "Canada Goose," as it is usually named in British books, well deserves attention as a domesticated animal. I have seen it in a tame state in the possession of Mr. A. Downes, of Halifax, and other persons in that vicinity; and also crosses between it and the common goose. It excels the common goose both in elegance of form and in the quality of its flesh. The cross between the common and wild goose is excellent for fattening; but being a male it will not answer for breeding from.

Nothing has been said in the foregoing pages of the practice of *cramming* fowls, with the view of producing an unnatural fatness, enlargement of the liver, etc. Unless skilfully conducted, this practice may do more harm than good; and poultry is really in the best condition for the table, as well as most wholesome, when it is in good healthy flesh and fatness, produced by abundant natural feeding accompanied by moderate air and exercise. In this Province poultry is too frequently far below this condition.

APPENDIX TO POULTRY.

I am indebted, for the following additional hints, to Mr. A. Downes, of Halifax. They merit special attention, as the results of experience in this province, by a person accustomed to observe in natural history:—

The Poultry House should be in a dry situation, with a south aspect, and should be made as warm as possible in winter. It should

have a large window to admit the sunlight. It is better to have no floor, as this harbours rats, but it should be swept out once a week and strewed with some litter, which will make good manure. It should be well whitewashed inside and out; this tends to destroy lice or ticks. Hens prefer a darkish place to lay in. Boxes for this purpose should be placed in the floor or against the wall, with a board over them to prevent the fowls from dirtying the nests.

"If the fowls have not the run of the premises, give them as large a yard as you can. They should have grass, pounded oyster shells or old lime, gravel and clean water. They should have access to dry earth to dust themselves. If kept under cover, it will always be sufficiently dry. A yard with rich earth will furnish them with plenty of worms. You cannot rear fine chickens unless they get worms. A brood of young chickens in a garden are of as much use as a man, by freeing it of insects. Confine the hen in a coop, and allow the chickens to run around."

"*Food.*—The cheapest in this province is barley and oats, with grass or vegetables in summer. In winter, they should have, in addition, potatoes or turnips boiled and mashed up with meal or shorts, with occasionally a little animal food. The pot liquor that meat has been boiled in is good to mix their meal and potatoes with. Cards and meal are the best food for young chickens. It is well to confine the hen near the kitchen door, and allow the chickens to run about."

"*Choice of Stock, &c.*—Always pick out the best and healthiest fowls to breed from. If this is attended to, I do not think that breeding in and in is detrimental, at least for a long time. Fowls that have been liberally fed, and have a warm house, will lay during the winter. Pullets are the best for this. Fowls two years old are the best to breed from. They should not be kept after they are four years old, as they do not lay so well. Six or eight hens to one cock will ensure most of the eggs to hatch strong healthy chickens."

"*Kinds of Poultry suited to this Province.*—*The Grey and Speckled Dorkings* are the best kind of fowl; where you wish to keep but one kind. They lay well, sit well, and make an excellent stock for the farm or market. When full-grown, the pullets weigh five pounds and the cock eight. Their meat is fine and juicy; they have large and plump bodies, with a broad, full chest, like the partridge; the pure breed have five toes; they are very hardy, and the young are easily reared, a matter of great importance in this climate. Capons of this breed weigh from 10 to 12 lbs."

"*The Black Spanish* is not surpassed either in utility or beauty by any other of the poultry tribe; the comb and wattles, however, are very apt to get frozen in this climate; they should be kept in in very cold weather. The hens lay very large white eggs; they never want to sit. If you wish to breed them you must employ other hens for that purpose."

"*Cochin China or Shanghai.*—The eggs of these breeds are small

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for their size, and of a brown color; they frequently wish to sit, but prevented they will re-commence laying; they do not appear to grow so large in this climate as in more southern latitudes, though they are quite hardy; the flesh is coarse, and they want depth of breast; they make, however, a good cross with almost any other kind of fowl, and these cross breeds have a better shape, larger eggs, and finer flesh."

"*The Brahma Pootra* is a large white variety, with wings and tail edged with black, feathered legs, and short tails; the form resembles that of the Shanghai, of which this is probably a variety. I have just received four of this breed, and do not know much about their qualities as yet; they are at present the top of the fowl fancy in England, where their eggs have been sold for four guineas a dozen."

"*The Bolton Grey* is a middle sized fowl, with white body spotted with black, which gives them a very pretty appearance; they are good layers, and never want to sit; they stand the climate well. I had some pullets of this breed that laid very early in the fall. The Bolton Greys are profitable fowls where eggs are the object in view; but if you wish to breed them they must be hatched under other hens."

"*The Golden Hamburgh* is a very handsome variety, the cocks of a bright yellowish red, and the hens yellow with black marks; they are smaller than the Bolton Grey, good layers, small eaters, and do not wish to sit."

"*The Algerine* is a breed which I obtained from the captain of a Prussian ship, who obtained them from Algiers. They are black grey or yellow, and have much of the appearance of Spanish fowls, though smaller; they have large drooping combs and gills. I have found this breed more profitable than any other; they are hardy, grow rapidly, lay well, and the eggs are large for the size of the birds. They are wild and active, and seldom wish to sit. I was informed that when on board ship they continued to lay constantly, a good evidence of their laying qualities."

Mr. Downes having received a small grant from the Legislature for the purpose of importing and diffusing improved breeds of poultry, has made arrangements to supply eggs of the best kinds in the present spring, at the following rates:—Dorking Grey, Black Spanish, Cochon China, Bolton Grey, Golden Hamburgh, Algerine, White Bantam, Red Bantam, Aylesbury Duck, Top-knot Duck, large sized Turkeys, at 5s. 6d. per dozen; Brahma Pootra and Chinese Silk Bantam, at 25s. per dozen; English Pheasant, at 12s. 6d. per dozen. The eggs will be well packed in boxes, suitable for conveyance to any part of the province, and may be obtained by applying to Messrs. J. North & Sons, Halifax. This will afford a good opportunity to persons desirous of introducing any of these breeds into places where they are not known.

VII. GENERAL HINTS ON HUSBANDRY, ESPECIALLY AS CONNECTED WITH THE MAINTENANCE OF STOCK.

1. *Ploughing.*

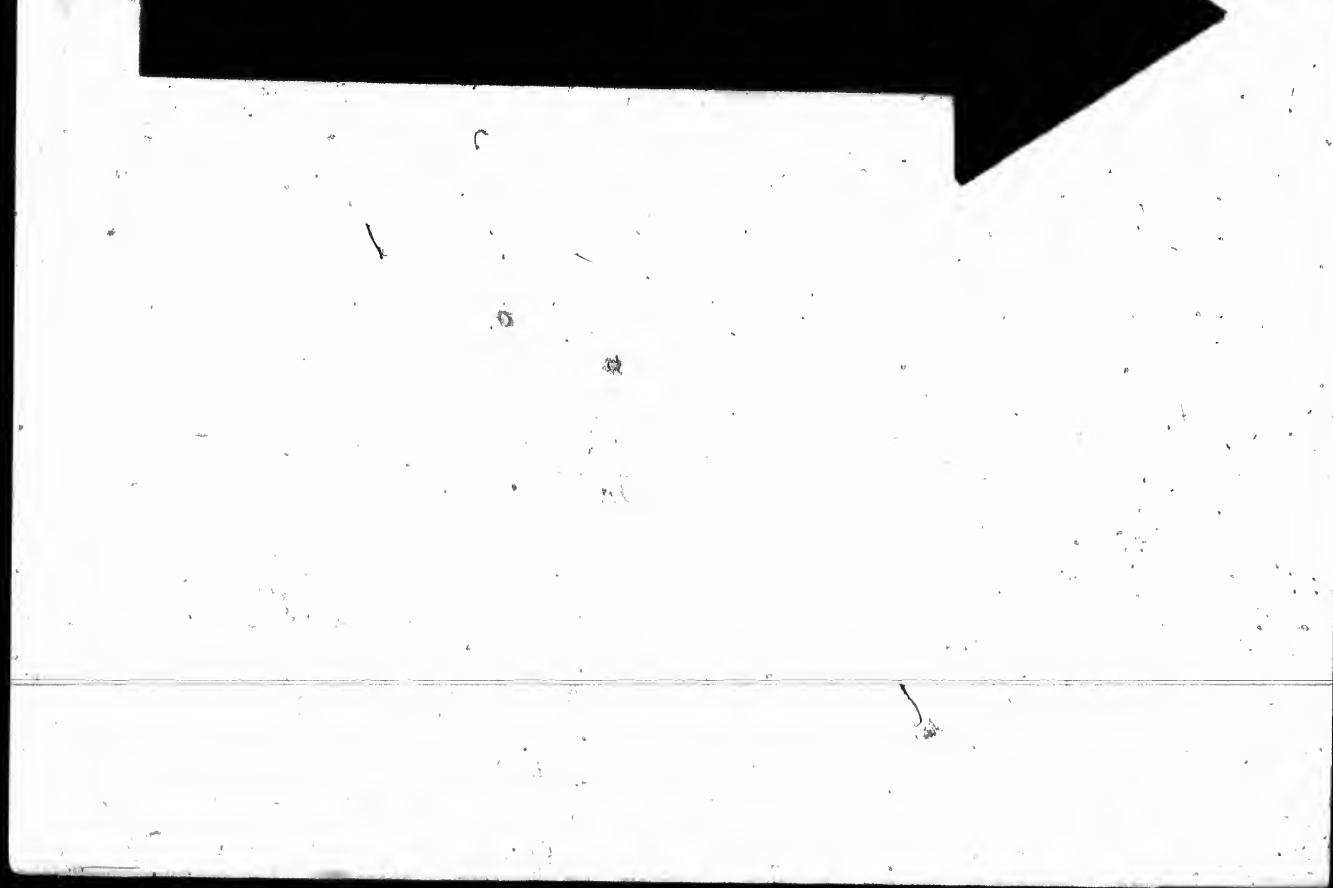
Next to the natural fertility of a soil, and the manuring which it receives, the tillage bestowed by the farmer, is the most important element in the production of heavy crops. The thorough stirring of the ground by deep ploughing and subsoiling, deserves far more attention than it has received in this Province. The following remarks on these subjects are extracted from Stephens and Judge Peters:

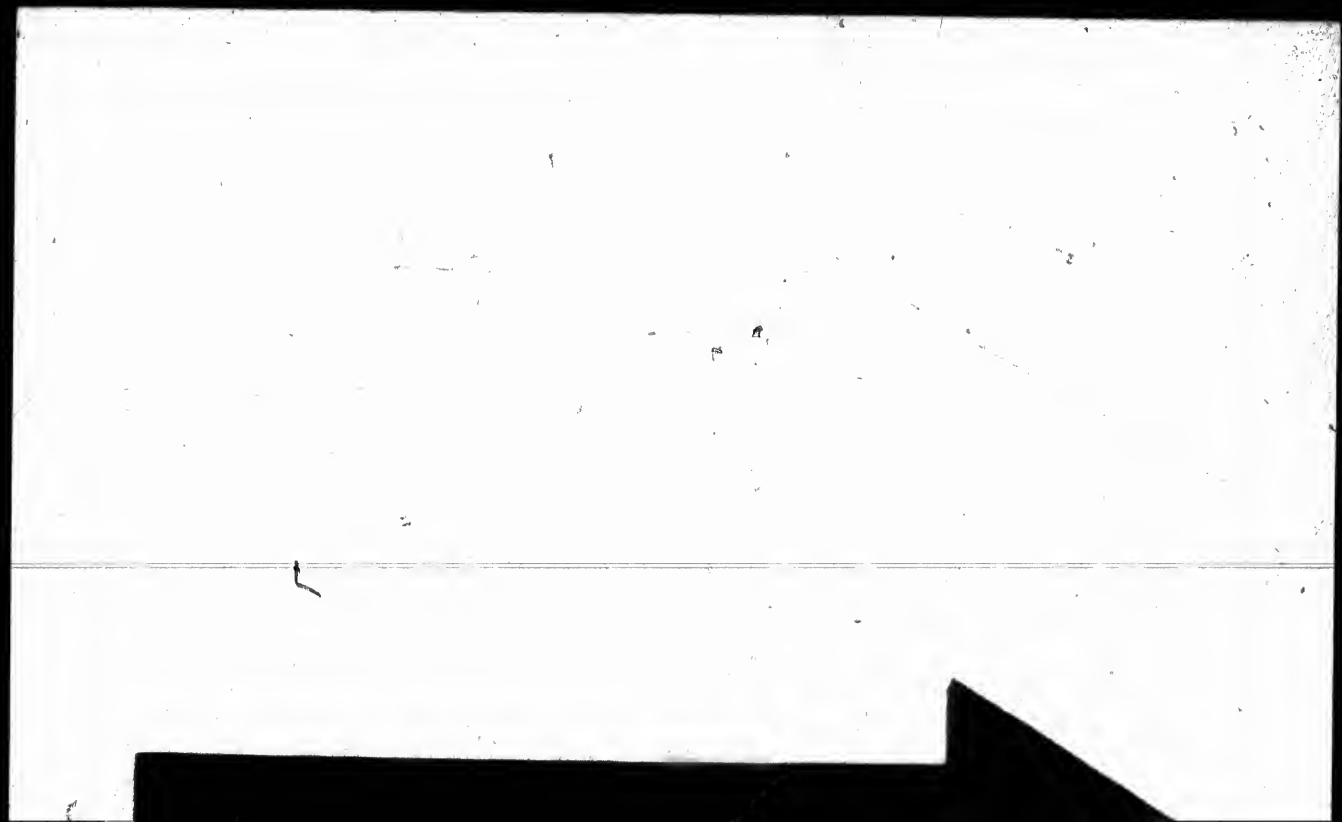
“When all the particulars which ploughmen should attend to in executing their work, in having their plough irons in a proper state of repair, in tempering them according to the kind of ploughing to be executed, in guiding their horses, and in ploughing the land in a methodical way, are considered, it ceases to surprise one that so few ploughmen become first-rate workmen. Good ploughing requires greater powers of observation than most young ploughmen possess, greater judgment than most will take time to exercise, more patience than most will bestow, and more familiarised with all these particulars, and greater skill than most can acquire, to use them all to the best advantage. But want of attention is the great bar to young men becoming good ploughmen: and if they do not acquire the art when comparatively young, they will never do so in an advanced period of life. It is want of attention at first, that makes some ploughmen bunglers all their days, and the great majority exhibit mediocre attainments. The latter class no doubt is preferable to the former, because the injurious effects of *bad* ploughing are obvious; but the effects of mediocre compared with first rate ploughing, though not so easily ascertained, must also be considerable. ‘It is well known,’ says Sir J. Sinclair, ‘that the horses of a good ploughman suffer less from the work than those intrusted to an awkward and unskilful hand; and that a material difference will be found in the crops of those ridges tilled by a bad workman, when compared with any part of the field where this operation has been judiciously performed.’ The truth is the young man desirous of being a good ploughman ought to be taught day by day by an experienced workman, to temper the irons, and guide the plough according to his strength.”

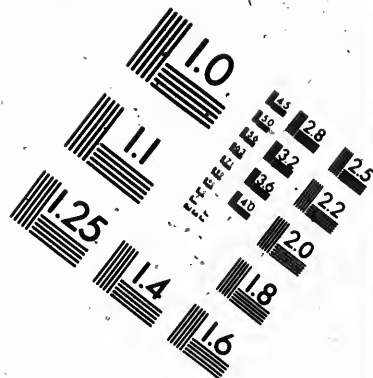
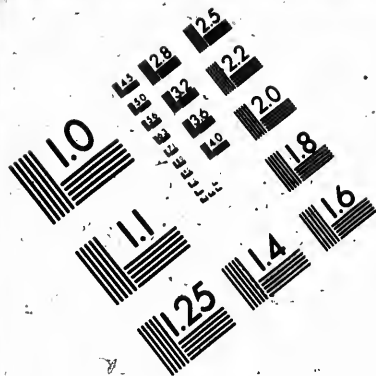
“A good ploughman will temper the irons so as there shall be no tendency in the plough to go too deep or too shallow into the ground, or make too wide or too narrow a furrow-slice, or cause less or more draught to the horses, or less or more trouble to himself than the work requires to be performed in the best manner: and he will also temper them so as to hold the plough with ease to himself, have plenty of leisure to guide the horses aright, and execute the work in a creditable

manner. The proper *form* and *position* of the furrow-slice are essential requisites in good ploughing; the furrow-slice should always be of such dimension and laid in such position that *the two exposed faces in a series of slices shall be of equal breadth*, and any departure from this rule is a positive fault. Laid up agreeably to this rule, furrow-slices will not only present the maximum of surface to the atmosphere, but also contain the maximum of cubical contents. The furrow-slices should be quite straight; they should also be quite parallel in length, and this property shows that they have been turned over of an uniform thickness, for thick and thin slices lying together present irregular horizontal lines. The furrow-slices should be of the same height, which shows that they have been cut of the same breadth; they should present to the eye a similar form of crest and equal surface. The furrow-slices should have their back and face parallel; and to discover this property after the land has been ploughed requires rather minute examination; but it is easily ascertained at the time of ploughing. The ground, on being ploughed, should feel equally firm under the foot at all places; for slices in a more upright position than they should be, not only feel hard and unsteady, but allow the seed corn to fall down between them and become buried. Furrow-slices in too flat a state always yield considerably to the pressure of the foot; and they cover each other too much, affording insufficient mould for the seed. Furrow-slices should lie at the same angle (45°), thus presenting crests in the best possible position for the action of the harrows. Crowns of ridges formed by the meeting of opposite furrow-slices, should neither be elevated nor depressed in regard to the rest of the ridge. The last furrow-slice should be uniform with those of the rest of the ridge."

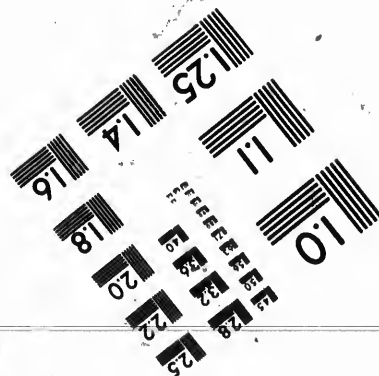
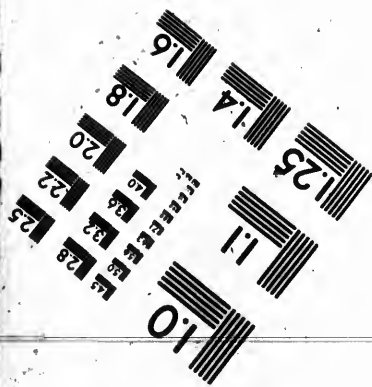
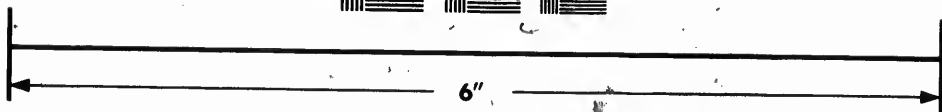
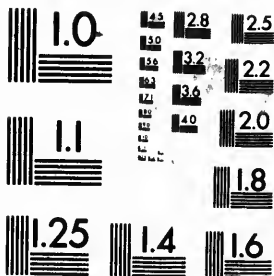
"Whatever mode of ploughing the land is subjected to, you should take care, when ploughed for a winter furrow that the furrow-slice is of the requisite depth, whether of five inches on the oldest lea, or seven inches on the most friable ground; and of the requisite breadth of nine inches in the former and ten in the latter; but as ploughmen incline to hold a shallow and broad furrow, to make the labour easier to themselves, and to go over the ground quicker, there is no likelihood of their making too narrow a furrow. A furrow-slice in *red* land should never be less than nine inches in breadth and six inches in depth in the strongest soil, and ten inches in breadth and seven inches in depth on lighter soils. On clay soil that has lain long in grass, nine inches in breadth and five inches in depth is as large a furrow-slice as may be obtained; but on lighter soil with younger grass one of ten inches by six and even seven is easily turned over." Departure from the rule of deep ploughing "is admissible only in those lands where a naturally thin soil rests on a subsoil of sand or gravel, very poor and impregnated with oxides of iron. To plough deep *at once* in such soils might run the risk of injury to the scanty quantity of soil naturally existing. But it is to be observed of soils of this kind, that the subsoil has always a tendency to *pan*; and if such does exist, deep ploughing alone in the







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form of *subsoil ploughing*, will destroy the pan, the frequent cause of sterility in soils, by breaking it up and exposing it to the air, a way of ameliorating both soil and subsoil."

The following hints are worthy the attention of judges at ploughing matches, in which, here as in Britain, neat and uniform, rather than deep and thorough ploughing, are often preferred.

"The primary objects of the institution of ploughing matches must have been to produce the best examples of ploughmanship, and by the best must be understood not only that which shall *seem* to be well done, but that which is thoroughly and properly done. To be particular, the award should be given to the plough that produces not only a proper surface finish, but exhibits along with that the power to cut and turn over the *greatest quantity* of soil in the *most approved manner*. Let a code of rules be instituted to guide the judges of ploughing matches in delivering their awards. Let these rules direct the land to be thoroughly ploughed to the bottom of the furrow, as well as satisfactorily to the sight. When such rules shall be promulgated we may hope to see ploughing-matches exceed their pristine integrity, doing good to every one concerned in them, and restoring the confidence in them which is at present on the wane."

Judge Peters strongly insists on deep ploughing, which is as much neglected in Prince Edward Island as in Nova Scotia, and from a similar cause, that desire or necessity to go over a *large surface* quickly and with little labour, which is so injurious to every branch of agriculture in new countries.

"The deeper the soil is the nearer together can plants be made to grow, and the greater number of them will obtain perfection, and consequently the larger will be the crop. A deep soil also suffers less from drought and from moisture than when it is shallow; when a great deal of rain falls the water sinks into a soil loosened by deep ploughing, such a soil absorbs a quantity of moisture proportionate to its depth before it suffers any to return to the surface. This is the reason why garden ground, which is well tilled with spade labor, never suffers from excess of humidity, even when the surface of shallow soils would be drenched with moisture. So long as the water does not stand on the surface it does little or no harm to the plants. Deep lands retain the moisture which they have absorbed for a considerable time, and communicate it to the surface, when that becomes parched and dried up.

Nor is this all, crops of grain grown on deep soil suffer much less from sudden changes of temperature or from drought or from heat; because their roots being able to penetrate further, feel changes in the weather less. During very hot weather it is evident that the plants are much fresher in deep than in shallow soils.

Lastly, it has every where been remarked that grain grown on deep soils is much less liable to be laid, even when very rank in growth, this is doubtless owing to the greater degree of strength which the depth of the roots gives to the lower part of the straw, a strength which grain

growing on shallow soils can never attain, because then the fresh shoots put forth by plants growing closely together cannot find sufficient nutriment to enable them to retain their full vigor.

But if we would have a soil attain all these advantages, and permanently possess them, it is requisite that from time to time it should be ploughed to the very bottom of its vegetable layer, turned over, loosened, and every part submitted to the beneficial action of the atmosphere; unless this is done it will, if merely ploughed shallow, generally lose all those advantages of which we have been speaking. From repeated treading of the horses' feet while ploughing, a hard crust, or pan, will be formed immediately beneath the sphere of the plough's action, which cuts off the earth beneath it from all communication with the atmosphere, and no root can penetrate it. Thær says:

'Experience has convinced me that it is not necessary that this deep ploughing should take place every year, but that it should be repeated once every six or seven years, especially if, during the interval, the depth of the ploughings given to it are varied, for nothing contributes so materially to form the crust spoken of as repeated ploughings of equal depth. Land ought, therefore, to be ploughed every seven years to the bottom of its layer of vegetable soil, and the intervening ploughings may be more or less superficial and varied in their depth, according to the purposes for which they are bestowed.'

There can be no doubt that the shallow ploughing generally adopted in this island is a most erroneous practice. There may be some cases where the vegetable soil is very shallow and rests on gravel or sand, where the farmer cannot plough deep without injury, but most of the soils of this island may be ploughed eight or nine inches deep with the greatest advantage. Take most of the worn out lands of the island and plough them with a furrow of six honest inches deep, and they will at once yield a better crop than they have given for the last ten or fifteen years, because the soil which would then be brought to the surface has not been exhausted. Some will try this experiment and find what I say correct; but do not imagine because you see this worn out land all at once give a good crop, that it will continue to do so: its fertility is caused by a little fresh earth, from which certain substances necessary to the growth of plants have not been taken, and it will soon be exhausted if you crop it without manuring, therefore sow it with buckwheat and plough it in, and treat the land as recommended in the chapter on green manuring.

Two years ago I had an opportunity of testing the advantages of deep ploughing. A field of about four acres, which had been very much exhausted, was intended for turnips and carrots; in cross-ploughing I directed my ploughman to go nine inches deep, which, as it had only received the ordinary kind of shallow ploughing before, was very hard work for the horses, and when half the field was done I found it necessary to go three inches lighter, as the horses could not stand it. The cross-ploughing was east and west, the drills of turnips and carrots

ran north and south: the part ploughed shallow and that ploughed deep were manured exactly alike, and the seed sown at the same time, but any one, in walking over the field, could see the great superiority of the crop on the deeply ploughed land; on pulling we estimated the yield of turnips on the deep ploughed land to be about one hundred and fifty bushels, and the carrots about eighty bushels per acre over that on the shallow. The subsequent wheat crop on the deep ploughed land also maintained the superiority. I mention this as an instance of the benefit of deep ploughing, but by no means recommend any one to follow my example of deepening so suddenly; the deepening should be gradual, that is, going an inch and a half to two inches deeper at each ploughing, until you get eight or nine inches turned up. Thær remarks:—

‘In the greater number of cases in which it is desirable to plough the land to a greater depth than has before been attempted, it is best not to add above two inches in depth of virgin earth at a time to the vegetable soil, more than this quantity cannot be properly ameliorated and mixed with the upper layer.’

And this deep ploughing which brings up the new earth, ought to be done, if possible, in the summer or early in the autumn, so that the newly turned earth may be exposed to the air for the longest period of time. The air acts on certain substances in this new earth and fits it to sustain plants, which in many cases it would not do when first turned up; an example of this may be often seen in earth dug from cellars; when first taken up plants would not grow in it, but by being spread on the grass lands it absorbs the gases from the atmosphere and its mineral substances are prepared by the action of the air for the plants, and thus the spots on which it is spread become more fertile. In the same manner new earth turned up by the plough enters into contact with the atmosphere, and every particle of it becomes saturated with atmospheric substances, and the new earth thus increases the fertility of the field.

Make it a rule to plough your lea land five or six inches deep, but let the deepest ploughing be given when the land is intended for turnips, carrots or other roots. I would not recommend new earth to be brought up in ploughing land which has been in turnips or other roots, and which is intended for wheat or barley, because the manure which has been applied with the roots will then be turned too deep. I think that by thus turning up new soil when ploughing turnip land for wheat, my wheat crop has been injured, which is easily accounted for. Land from which turnips or other roots has been removed must be ploughed late in the fall and sown with wheat very early in the spring; and the new earth, not having been long enough exposed to the air to absorb the gases and have its mineral substances fitted for the plants, checks instead of assists the growth of the wheat.

I have no doubt many will say the horses here could not carry so deep a furrow as I recommend. If they are badly fed they cannot, but

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let farmers keep fewer and feed them well, and any of our Island nags will be able for the gradual deepening recommended; and when once the ground is well stirred to eight or nine inches deep it is easy to plough to that depth afterwards."

2. *Root Crops.*

The long and severe winters of this province render attention to the cultivation of turnips, and other roots, imperatively necessary to the support and fattening of stock. Without these, except where the farmer possesses tracts of productive marsh, he is a mere slave to his stock, without deriving from it the profit which he ought to receive. With a proper degree of attention to their cultivation on the other hand, hay is economised—working cattle are more easily kept in good condition—cattle can be fattened in winter, and milch kine can be kept in a productive state throughout the season; at the same time attention to manures is encouraged, and a proper rotation is rendered necessary, by which means the grain and hay crops are also improved. Even in Britain, with its milder winters, we are informed that before the extensive cultivation of the turnip was introduced, "it was impossible to cultivate light soils successfully, or to devise suitable rotations for cropping them with advantage. It was also a difficult task to support live stock through the winter and spring months; and as for feeding and fattening cattle and sheep for market during these inclement seasons, the practice was hardly thought of, unless when a full stock of hay was provided, which only happened in a very few instances. The benefits derived from the turnip husbandry are therefore of great magnitude. Light soils are now cultivated with profit and facility; abundance of food is provided for man and beast, and by the soil being cleaned with this crop, a bed is prepared for grass seeds, wherein they flourish with greater vigor than after any other preparation."

Our best colonial authority on the turnip, is Judge Peters, whose account of its culture is therefore inserted entire in this place, though much of it has already been given in the "Contributions":—

Culture of the Turnip.

"Buel says:—

'Assuming the average product of hay at a ton to a ton and a half, (which is much more than is generally obtained in this Island,) and of Swede turnips at six hundred bushels per acre, and allowing a bushel and a half of Swedes (90lbs.) to be equivalent for farm stock to 20lbs. of hay, an acre of Swedes will go as far in the economy of feeding as nearly three acres of meadow. The three acres of grass are found to give less than 9,000lbs. to the dung yard, while the one acre of Swedes gives 36,000lbs., or four times as much as the three acres of grass land.'

Until our farmers are convinced of this, and shall cultivate turnips

as the principal food for wintering their stock and fattening their cattle, we shall find Agricultural improvement advance with tardy steps: we shall continue to see our markets glutted in autumn with beef at twopence a pound, because, for want of turnips, every one slaughters his beast then, instead of keeping it until it is in good condition; and we shall find the progeny of our fine imported breeds deteriorating in character, instead of maintaining the valuable properties of their ancestors.

Turnips are generally sown in that part of the rotation which closes one course and commences another; and in this Island it will in general be found convenient to sow them after oats, sown on ley. On new-burnt lands there are few weeds, and excellent crops may be raised with little labour, by merely scattering the seed and hoeing it in; but with this exception, they should always be sown in drills, under which system three acres can be cultivated with less labor than one acre broad cast. The land intended for them should be well and deeply ploughed in autumn, and cross ploughed in the spring, then harrowed and rolled to break the lumps. If the land is foul with couch, have it well cleaned, or the turnip crop will be a failure, or cost more to keep clean than would have cleaned the land before they were sown. Next open the drills: thirty inches apart is the best distance for ordinary culture, as it gives room for the plough and horse hoe to work freely between the drills without injuring the plants. If a prize crop is wanted, perhaps twenty-seven inches will give a somewhat larger yield, but they will be more troublesome to clean; and I am convinced that farmers, generally, will find thirty inches between the most convenient distance. When the drills are opened, then cart in your manure, which should be short, and make it in small piles, so that it can be regularly spread in the drills; by making the piles so that they will spread into the three drills in which the horse walks and the cart wheels run, you will spread it more evenly, and with less labor, than from the larger piles, in which I often see it deposited. As soon as the manure is spread in the drills, and before the sun can dry it, split the drills with the plough, which will cover the manure and make a ridgelet over it, then run a light roller length ways along the drills, so as to flatten them on the top, and drill in the seed at once; it is very important that it should be done as soon as the drills are raised, for the ground is then fresh and damp: whereas, if you leave it, the tops of the drills get dry, and the seed is longer coming up, and the plants grow more slowly. I frequently see persons waiting for days, until the whole of the land is prepared, before they sow. This is a very bad practice, because, not only do the drills become dry, but the weeds begin to shoot before the seed is sown; and when the plant comes up, it finds the weeds up before it, and is consequently smothered, and is much more difficult to hoe and clean. The least you can do for the turnip is to give it fair play, and a fair start with its numerous weedy competitors; and, therefore, make it a rule to sow in the evening, or, at furthest, the next morning, every drill that has been dunged and covered during the day.

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Some spread the manure broad cast, and plough it in with the second ploughing, and raise fair crops; but by putting it in the drills, the whole strength of the manure is given to the roots of the turnip, and therefore, must promote its early growth more than when spread over a large space of ground. When the manure is ploughed in broad cast, I think it should be done in the fall; a method which seems to produce excellent crops, and saves labor in the spring, when time is of most value to the farmer.

As to the best time for sowing Swedes, there is much difference of opinion; they may be sown from the 20th of May to the end of June; they continue to increase in weight until the frost compels us to pull them, and, therefore, the earlier they are sown, the heavier will be the crop. When sown in May, I have always found them escape the fly; but the best protection against this insect, is thick sowing—never sow less than three pounds of seed to the acre, and you will seldom be without sufficient plants after the fly has done its work. Aberdeen Yellows may be sown from the first to the end of July.

Hoing and Cleaning.—This is the most important part of turnip culture, for manure as heavily as you please, if this is neglected, or carelessly or imperfectly done, you will not have a good crop; a few days' delay, carelessness, or inattention now, will make a difference of hundreds of bushels per acre. There is no crop on your farm which can so ill bear delay at this time as your turnips, and unless you can afford to throw away the labour you have expended, and to forego the benefit of a good supply of turnips for your stock, do this *when it should be done, and do it well.* If you are short handed, let every man, woman, and child, who can lift a hoe, or pull a weed, go to work in earnest, and the job will soon be accomplished; and, what is more, your children will become expert at turnip culture, on which all successful farming in this Island will, before long, depend: and remember that a good turnip hoer never takes his eye from the ground until called to dinner; recollect this yourself and impress it on the children, and there will be no stopping to talk, nor ceasing work to gaze at every passer by, by which so much time is often lost. The method I have found best in hoeing, is this: as soon as the leaves are between two and three inches long, run a plough between the drills, taking away the earth on each side to within about two inches of the plants, this will make a little ridgelet between each drill, and cover up all the weeds; and if the horse hoe is run about a week afterwards, they will be found quite rotten and form a good manure for the land; (some use the horse hoe only, but if there is much yar and weeds, the plough makes the best work.) Then set to work with the hand hoes, and thin the plants five inches apart: do not be afraid of stripping the roots of the plants, as the more they are exposed the better; when the plants are a good size, and the leaves begin to touch each other, a second hoeing must be given, cutting out every other plant; this will leave them ten inches asunder, taking away at the same time any weeds that are between them. This

second hoeing is very quickly done. If the land is very weedy, the horse hoe should be run between the drills, once before the second hoeing, and once after, and this will complete the work.

Besides the manure covered in with the plough, small quantities of stimulating manures, placed close to the seed, are of great benefit to the crop; a small quantity of ashes run with the hand along the tops of the drills just before the seed is drilled in, will cause the young plant to grow more quickly, and get sooner beyond danger from the fly: twelve or fifteen bushels is sufficient for an acre, more than twenty is waste. When the manure is ploughed in the autumn, if you have a compost of mud and lime, or mud or ashes, to apply to your turnip land, in addition, the best way of doing it is, after the ground is ploughed in the spring, cart on and spread twenty to twenty-five loads of the compost, then harrow and roll, and then throw the land into ridgelets, with the plough, thirty inches apart; this gathers the greater part of the compost which has been spread into the drills, and within reach of the suckers of the turnip; then roll the drills, and sow the seeds. Night soil and bones are excellent help to the crops—the mode of applying them has been already pointed out.

Pulling.—Few directions need be given about this part of the business. The tops and tails should be cut off close to the turnips, or they will not keep so well. Some persons advise the tops to be hauled off and fed to the cattle on other fields. I have tried this, and am convinced it is a very bad practice. In the first place, as food they are scarcely worth the labor of hauling off; they will keep cattle alive, but if they happen to be fat, they will reduce their condition; and if the milch cows get them, the butter will be unfit for market. But the great objection to removing them is, that it robs the land of what ought to be left to feed the succeeding wheat crop. A heavy crop of turnips is exhausting. In Britain a portion of the turnips is consumed on the land, by sheep. Our climate will not permit this; therefore, as we have, to remove the turnips, we should at least leave the tops. If you wish to feed them, and there is time to do so before ploughing, let them be eaten where they grew; or if not, plough them in, and, decaying in the soil, they will enrich the land; whereas removing them is not only a waste of labor, but your wheat crop will reproach you for having done so.

Storing.—Some complain of turnips being difficult to keep; those who find them so, keep them too close: with proper management, there is no difficulty in any quantity. They should be put in piles in the field when first pulled, and covered with tops or straw, and a little earth. Here they will sweat a little. A dry day should be chosen to cart them to the root house. My root house is dug four feet deep, and then the roof pitched from the earth, and covered with sea weed and earth, well sodded over; the floor formed of slabs and longers, raised six inches from the bottom, and divided into three divisions. It will contain about two thousand five hundred bushels of roots, and I generally

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fill it full, and have never lost any turnips. In the top there is a chimney, which is never shut night or day during the winter: the vacancy below, and the partitions, allow all the confined air to ascend and as it is constantly escaping through the chimney, no frost comes down. Any one who will ventilate his root house in this way, will find the turnips as sound in June as when first put in. The situation of the root house is a matter of importance; it should be attached to the barn, and entered from the barn; this will save a deal of labor in carrying them to the cattle during the winter. Some store them in their cellars, which is the worst place that can be selected, as they are generally too hot and close to preserve the turnips, too far from the barn for convenience, and the gas which escapes from them renders the air of the house unwholesome."

The following additional hints on the turnip are selected from Stephens:—

Varieties of the Turnip.—No fewer than 46 varieties are enumerated, of which, however, only a few deserve the attention of the farmer.

The *Swedish Turnip* takes the first place for weight, value of crop, and capacity for winter storing; and of 18 varieties of the Swede, the *Purple Top* has long obtained the preference. It is of an oblong form, skin under ground and flesh orange yellow, skin above ground dull purple—the skin is rough—the rind thick, and the flesh hard and crisp. The largest Swedes weigh from 8 to 10 pounds, and the largest are the most rich and nutritive, which is not the case with other turnips. A good crop weighs from 30 to 35 tons per imperial acre.

The *White Globe Turnip* is the best for early maturity, sweetness, and gross weight of crop; but it does not keep so well as the Swede. If of a good variety, its skin will be smooth and white, the neck of the top and tap root small, the leaves long and upright, and it will not emit a hollow sound when struck, as the Tankard turnip (which is inferior to the White Globe*) does. A good crop of White Globes weighs from 30 to 35 tons per imperial acre. The White Globe is quite equal to the Swede for feeding in autumn and early winter, and should be largely cultivated for that purpose.

The *Aberdeen Yellow* or *Yellow Bullock Turnip*, when of a good variety, is round and wider than deep, with smooth skin, orange yellow below ground, and bright green above; the tap root and crown are small, the leaves soft and spreading, the flesh deep orange, crisp, and not so juicy as that of the Globe. The Aberdeen keeps better than the white, and not so well as the Swede. A good crop weighs from 30 to 32 tons per imperial acre.

The above varieties will be found the most profitable in this country. It must be observed, however, that with culture and manuring, any

* This refers to the White Tankard. The Yellow is better. I have been told by a good farmer that the Tankard will thrive on poorer soil, and is less injured by fly than other turnips.

variety of turnip will be more nutritive in proportion to its weight, than with inferior treatment.

"*Bone dust* is the most important manure for turnips in addition to that produced on the farm. I have tried to raise turnips with different quantities of bone dust, varying from 12 to 24 bushels per acre, and found the crop improved up to 16 bushels, but the quantities beyond that produced no greater effect. As good crops have been raised with 8 bushels of bone dust mixed with a quantity of coal ashes, as with 16 bushels. A better method than using bone dust alone, is to apply it in conjunction with farm-yard dung, say ten or twelve tons of farm yard dung, with eight bushels bone dust. The dung, which should be well rotted, is covered in with the drills, and the bone dust sown afterwards along with the seed."

"The *distance between the rows* of turnips has been fixed, conventionally no doubt, at twenty-seven inches, which is a very convenient distance for drilling up the land in the first place, with the common or double mould board plough, for dunging it with the ordinary tilt cart, and for working the implements employed in turnip culture, such as the sowing drills, and the succeeding scufflers and drill harrows. The distances between the plants should be about twelve inches for Swedes, and nine inches for yellow turnips and globes, and to insure regular and proper distances, the *singling* of the crop with the hoe should be regarded as one of the most important operations which claims your attention. For example, 5 lb. turnips at 9-inches asunder give a crop of 57 tons 12 cwt. : whereas the same weight of turnip at eleven inches apart gives only a little more than forty-seven tons. Now how easy is it for careless people to thin out the plants to eleven instead of nine inches, and yet by so doing no less than 10½ tons of turnips are sacrificed."

The Mangold Wurtzel

Is cultivated in much the same manner with the turnip, but may be thinned to fourteen inches asunder in good ground, and may be transplanted with greater certainty than any variety of turnip, and is much less exposed to the attacks of insects. Its large proportion of sugar and freedom from offensive flavour, adapt it admirably for feeding milch cows, though if fed *exclusively* on these roots their milk is said to fall off. The mangold wurtzel keeps even better than Swedes. I have known them to be kept in a cool cellar until the autumn following that in which they were taken in, and they are said to improve in quality by keeping. Rich clay loams suit the mangold wurtzel better than light sandy soils. It thrives well however in drained peat bog. "There are several varieties of mangold wurtzel; the long red, the long yellow, and the globe orange or yellow globe; which names truly indicate their respective characters. The globe orange thrives best on light soils, and the long yellow is in a better state for use in the early part of

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winter than the long red. The circumstance of beet not being a safe root to give to cattle till it has been some time out of the ground is the only objection to their indiscriminate use." In Nova Scotia the long red and yellow globe varieties have been somewhat extensively tried. The former does well only on rich deep soils. The latter will thrive on any soil that is fit to produce good Swedish turnips. The seed of mangold wurtzel resembles that of the beet, of which this plant is a variety. It should be sown by hand, and rather more deeply covered than turnip seed. It may be sown at the same time with Swedish turnip, or earlier if possible. The outer leaves may be stripped off mangold wurtzel in summer for food to cattle; but this injures the roots. No farmer who values the produce of his dairy, will willingly be without mangold wurtzel after having once tried it.

The Carrot.

The culture of this root is usually pursued on a small scale only, but its high nutritive power, its certainty and good keeping properties, as well as the large crop that it yields, make it deserving of more extended culture wherever there are deep and light soils, or they can be deepened by ploughing or subsoiling. The safest and most productive varieties are the long orange and white Belgian. On the culture of the carrot, Judge Peters remarks:—

"Carrots do not require the land to be so rich, but they want it very fine and deep. They seem to succeed best after potatoes; probably because the ground is then light and friable. After the land is cross ploughed, harrowed and rolled in the spring, it should be thrown into ridgelets, making them as high as you can, so as to give the plant as great a depth of the soil to grow in as possible; eighteen inches is width enough between the drills, but unless the land is very clean, thirty inches will be found the most convenient distance. Roll the drills, and drill the seed, while the earth is fresh and moist, in the same way as turnips. If you sow English seed, you will require four or five pounds to the acre, and then not be sure of a crop; but if American seed* is used, one and a half pounds per acre will be sufficient; as almost every seed grows, at least I have found it so. Eight or ten days before sowing, I mix the seed with fine sand, carefully sifted so that no stones or lumps are left to choke the drill, and keep it moistened with water in a warm room, stirring it up every day. When about to sow, I spread it in the sun for an hour or two, to dry, taking care not to dry it too much, which would injure the seed. I then place a guage, large enough to let a large buck-shot through, in my turnip drill (one of Birnie's), and drill the seed in the same manner as turnips. Seed thus treated is generally up in three or four days, and the plants have a fair

* Seed produced in the country is probably meant. That from the United States is not usually better than the English; but both are good when recently imported from respectable dealers.

start with the weeds. They should be sown in May, or early in June. In cleaning, use the plough and horse hoc; the same as with turnips. They should be thinned about two and a half inches apart. In August, when the carrots are about the size of a man's thumb, they should be lightly moulded with earth, like potatoes. As to the yield per acre, the smallest I have had is three hundred and thirty-eight bushels; but then the land being very foul, the drills were three feet apart, to admit of frequent ploughing between them. This last year I had an acre, and one-fourth in carrots, on ground which had been in potatoes the year before: it was dressed in the spring with forty loads of dung per acre; the drills were thirty inches apart; the yield on the acre and a quarter was seven hundred thirty five bushels; they were thinned about one and a half to two inches apart, but the carrots split the drills and made room for themselves, and grew large. Work the soil well, and give it an ordinary dressing, and you will be sure of from four to five hundred bushels per acre. The Long Orange and White, Belgian are the most productive. The haulm, or top, of the carrot, is excellent food: cows fed on it give very rich milk: all animals are very fond of it. As they do not appear to be so severe on the land as turnips, the tops may be hauled off and fed on the pasture fields; and an acre of White Belgians will, in this way, furnish a very large quantity of rich food in autumn. I have tried carrots on land manured with sea weed, and also with river mud; but they would not grow to any size, although turnips in the next drill, on the same manure, grew as well as those on dung. Old well-rotted dung, and ashes, seems the best manure for them. For fattening pigs I have found this root more valuable than turnips, and working horses while fed on them will not require oats."

The Parsnip

Deserves culture on account of its nutritive properties, and because it is the only root that we can leave in the ground during winter, for use in early spring.

"It will grow in a stronger soil than the carrot, and yet may be raised on even peat if sufficient manure be applied. Its culture should be precisely that of the turnip and the carrot, being a green crop and requiring a deep soil for the growth of its fusiform roots. Parsnips should receive twenty-five tons of farm yard manure in the drill, and four hundred of guano sown over the drill, as described in the case of the turnip; and the land then drilled up in the double form or with the setting up double mould-board plough. Parsnips should be singled whenever the plant can be seen, to a distance of eight inches apart in the drill—the stems and leaves spreading more than those of the carrot, require more room. The after-hoeing and cleaning of the land of weeds with the drift grubber, are conducted in the same manner as those for the turnip and carrot. The drill should be set up with the double mould-board plough, to heave the earth as much about the root as pos-

sible, as in the case of the carrot. In a dry season it is well to observe that moistening the seed with wet sand or earth, and stirring it daily, to be sown in the first moist weather, will forward its growth a fortnight. The parsnip should be sown as early as practicable."

In Jersey, parsnips are sown broadcast on old lea land, the sod and about twenty tons of manure being first deeply ploughed in with a trench plough, the plants are weeded, thinned and hoed by hand. In this way the crop yields twenty-seven tons and upward per acre, or "nearly sufficient for ten cows during the six winter months."*

3. Management of Animal Manures.

Under this head, I have extracted from Youatt, Judge Peters, and Young's Letters of Agricola, some valuable facts and opinions bearing on the all important subject of the preservation and restoration to the soil of the manure afforded by the animals supported on it. Neglect on this point has ruined multitudes of farmers; and enlightened attention to it is the most important agency in preserving fertility and securing gradual improvement. The extracts from Youatt and Peters will be new to most agriculturists in this Province; and those from Agricola, though they have been extensively read in bygone years, are little known to the younger race of farmers; though, I am sorry to say, about as much required by some of them as they were by their fathers.

(1). *Youatt on Manures.*—"Dung dropped by fattening cattle, possesses more fertilizing properties than the dung of lean cattle. The dung of those fed on rape, linseed, or other oleaginous seeds, is the richest; that of animals supplied with oil-cake, or those seeds of which the oily matter has been expressed is next in fructifying powers; then the dung of cattle fed with roots; next, that of such as are supplied with hay varying according to the goodness of their keep; that of straw-fed cattle, especially lean beasts, is the poorest of all."

"With regard to the relative power of animal dung, it may be observed that *horse dung*, when not too new, is admirably calculated for cold, sterile, and poor ground, the faults of which it corrects, while that of neat cattle is better adapted to warmer soils; but both, when combined together, or with earth or mud, are useful on any soil. The effect, however, is but transient, excepting in moist, tenacious soils, and even there it produces no permanent amelioration. When dung is thus used by itself on moist, clayey soils, it should be carried and turned in as soon as its first stage of fermentation has subsided; but when it is intended to be used on warm, light soils, it will be best to mix it with succulent vegetable substances, or earth or turf."

The dung of swine is of a fatter and richer nature than that of any other animal, and is supposed to be particularly excellent for grass lands and for cold clays. Sprengel, however, says: "It is the slowest

* Le Couteur.

to undergo decomposition—developes, in its putrefaction, little, if any, heat, and yields scarcely any ammonia. Esculent roots, manured with pigs' dung, acquire a disagreeable flavour, arising probably from a peculiar volatile substance emitted by the dung, or rather the urine, of the pig."

"There can be no doubt that, without preparation, it is not well to apply it to land. Incorporated with the manure heap, mixed with that of cattle, and there allowed to decompose and ferment, it becomes valuable. Mr. Poccocke, of Thilnstone, states that, knowing the excellence of pig manures, he has erected a large, dry shed, in which, first of all, he puts a layer of dry coal ashes, about a foot deep and four feet wide, to which he has all the deposits of the pigs, both fluid and solid, carried; as soon as it begins to ooze out, he adds more ashes, until the heap is about four feet high. A fresh layer is then commenced, and treated in the same way. After lying some time, it is turned twice or thrice, and is then fit for drilling. He tried it for turnips, and found the results far superior to those of guano, and equal to bone dust. The droppings of three pigs, if carefully thus preserved, he considers are ample dressing for three acres of land."

"The common mode of applying *sheeps' dung* is by *folding*; the benefit thus obtained is said to be derived from the consolidation of the land effected by their treading, and from their urine, to which may perhaps be added the perspirable matter exuded from their fleeces while lying upon the ground; but we question whether the volatile principles of the manure are not evolved under this system, and given off into the air. To secure real benefit from folding, it has been recommended that, as the fold is shifted, the land it has occupied should be immediately breast-ploughed, in order to cover in the manure and condense its ammoniacal gases within the soil."

"In too many farms the *urine* is allowed to run from the yard and stables into the horse-pond. This is an extravagant and reprehensible practice without any assignable reason to recommend it; still, where it is persevered in, it may be turned to some account by employing such pond water as a sprinkling or top-dressing for meadows. Mr. Gyde, in a paper sent to the Highland Society of Scotland, calculates that for every 10,000 lbs of the urine of the horse that is allowed to go to waste, the farmer loses 600 lbs. of dry matter of a highly fertilising nature; and that for the same quantity of the urine of the cow, the loss is 700 lbs. of dry matter. In Flanders the urine of each cow is valued at £2 per annum. These things have been too little thought of."

"Many interesting accounts of economical modes of collecting and applying the urine of cattle as a manure to land have been communicated; we select one which appeared in the "Farmer's Magazine," given by an intelligent farmer in the vicinity of Peebles. The farm-buildings were so disposed that the urine of all the stalls was conveyed by trunks to a dung pit, and the dung laid in a place appropriated to that purpose, instead of being thrown into the middle of the yard.

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The dung pit was twelve yards square, and four feet deep; and filled with mould previously carted into it, for the purpose of being impregnated with the urine and moisture of the dung. This pit produced about two hundred and eighty-eight cart loads, forty of which were sufficient for an acre. The expense of filling the pit is calculated at about £6; so that the advantage of the method is too obvious to be mistaken.

A German Professor, M. Schubler, instituted a variety of experiments, on the comparative value of different species of dung.

3 times the quantity of seed sown were produced, when no manure was employed.

5 times, when the ground was dressed with old herbage or grass or leaves.

7 times, with cow dung.

9 times, with pigeon's dung.

12 times, with human urine.

12 times, with sheep's urine.

14 times, with human dung or bullock's blood."

"It cannot be too often repeated, that in no way are manures more wasted than by constant exposure to the sun, air and rains; hence various expedients have been resorted to in order to prevent this loss. Among these are—the mixing it with dry earth, pulverised or burnt clay, charcoal, dry or charred peat, or other absorbent substances, which will in a great measure prevent this inconvenience; the erection of sheds over dung heaps; the covering of these heaps with turf sods, (the grassy side downwards,) where the dung is kept until it is old; and the formation of tanks and reservoirs."

Mr. Prideaux recommends "a staunch pit, rather deep than wide, being made to receive the drainings; a bed of humous earth may be first laid down, inclining toward the pit. Upon this spread hard stalks, etc., which are slow to decay, then a layer of dung mixed from the cow-houses, stables and sties, sprinkled with salt; next a layer of vegetable matter, as weeds, roots harrowed up, hedge clippings, fallen leaves and other recent herbage, of the same thickness, dusted with slaked lime; upon this a four-inch layer of peat, bark, saw-dust, sods, ditch or pond scourings, scrapings of the roads or coal ashes; then beginning again with the salted dung and adding the vegetable and humous layers until the heap is four or five feet high, always keeping the lime from coming in contact with the dung. Then pour over it the liquid drainage, till all is soaked through, and continue to repeat the layers, pouring the drainage upon every four feet of thickness. As the fluid passes through, it will dissolve the salt and lime, and carry the juices throughout. Slope the top of the heap and cover it with straw to carry off rain. Have gutters to carry off the fluid to the liquid manure heap, and in six months the heap will be ready for use."

"In addition to the numerous articles enumerated in the preceding chapters, we would observe that before the winter or fodder season com-

mences, the surface of the cattle-yard may be raised by spreading thereon fern, leaves, refuse straw, peat and similar vegetable matters. Every previous arrangement being thus made, the cattle should be kept within their yards throughout the winter season; but the greatest care must be taken to keep them dry, which will be difficult if the manure be allowed to accumulate; therefore where they are numerous, the surface litter of the yards may be removed to the dung-meers, and fresh laid down as already mentioned. A common method is to have the centre of the yard concave, so as to receive the drainage from the surrounding sheds and stables, which being covered with litter, and trodden by the cattle, soon becomes fit for the dung heap. This, so far as the manure is concerned, is an excellent method; but as the health of the cattle is also an important consideration, whenever the litter has become completely saturated, it should either be covered with dry straw or removed."

"Agriculturists are by no means agreed as to the point of allowing their beasts litter to lie on, and thus consuming their whole stock of hay and straw; or arranging the floors in such a direction that they may be kept clean by sweeping only, and litter rendered unnecessary. The latter practice was at one time adopted by the late eminent breeder, Mr. Bakewell, and sanctioned by many agriculturists. It would at first sight appear obvious that the largest quantity of dung must be produced from the straw and coarse food being consumed by lean beasts, while the richer and more succulent is eaten by the furring beasts, whether neat cattle, sheep or lambs. Mr. Bakewell, however, seems to have found that such was not the result, for he afterwards modified his system, and used a portion of the straw as litter, in which state it absorbs the urine and does not permit any part to be lost. Urine is generally admitted to be of far more value than straw that has been merely masticated and digested, without being combined with richer food. Leibig says: 'With every pound of urine wasted, we lose a pound of wheat.'"

"The augmentation of manure necessarily depends on the nature and application of the food given to animals. We have already pointed out the various articles of the vegetable kingdom, as well as the artificial foods that are best calculated for feeding and fattening cattle; and have endeavoured to evince the superiority of *soiling*, both as respects the economical consumption of food, and also the production of manure. The quantity of manure produced by a farm, may also be increased by having *standing sheep folds*. For this purpose, in Flanders the ground is marked out, and spread with dry sand four or five inches thick; on this are erected slight sheds, in which the sheep are housed at night, a small quantity of dry sand, (for which dry peat, etc., may be substituted,) being laid in every evening. This is cleared out once a week and carried to a dunghill, or spread upon the soil. The manure thus produced is well calculated for fertilising almost every kind of ground, and makes an excellent dressing for cold and stiff soils. Dry

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stable litter, from which the dung has been shaken out, may also be advantageously used in folds."

Dung steats may be tended and the manure augmented at different times, when no other business of greater moment stands in the way. They should be guarded from being torn or spread about by the scratching of poultry, or by swine, and therefore when in or near the farm-yard, should be surrounded by fences. If the heaps do not ferment, the process may be accelerated and assisted by watering them with the yard drainage, or with a solution of bones dissolved in sulphuric acid, and then covering them closely with earth or sods. Bleacher's lye and gas water have also been recommended for this purpose, and where they can either be cheaply or easily obtained, should be used. It frequently happens however, that fermentation proceeds too rapidly for the purpose of the farmer, and thus some of the most valuable properties of the manure are lost, and the quantity also becomes seriously reduced. In such case the heaps should be immediately turned and mixed with mould, and this operation should be repeated often enough to prevent the fermenting process from ever proceeding farther than may be necessary for the destruction of the seeds of weeds, and the decomposition of the fibre of the vegetable matter contained in them. Where stable dung is used, it will generally be found that when the straw has become so far rotted as to admit of being cut through with a spade, it is fit to be carried upon the land, and if allowed to remain longer in the heap, its substance and value will daily diminish. From what some farmers call 'rotten dung,' all the fertilising properties are so completely drained away, that it is of little other use than to loosen the soil and retain moisture."

"The following method of making dunghills, as practised in Middlesex, has a just claim on the attention of agriculturists. All the scrapings of roads, mud of ditches and ponds, and top mould of gravel pits, are spread in convenient spots as bottoms for dunghills. On these layers is carted all the dung produced on the farm, or which can be obtained from London, etc.; and to these are occasionally added chalk, ashes, soap-boiler's rubbish, etc. In this state the heap continues till within a month of the time of manuring the land, when it is thoroughly turned, the clods broken, and the drier parts thrown into the centre."

"Mr. Thomson, of Kirby Hall, recommends, 'to have a pit dug in the earth, into which to throw manures; the bottom of the pit is watertight and has a slope toward the centre, where a tank is placed so as to receive the drainings of the manure, which draining is frequently poured over the manure so as to keep up a regular but not excessive fermentation.' He has all the vegetable refuse of the farm spread over the bottom of the pit, and on this the manure is carted. When wanted for immediate use, the manure is lightly thrown together, and, after being soaked with the tank-liquor, covered with a thin layer of soil. If it is to be kept for six months or more, it must be pressed together, and thickly covered with soil or peat, so as almost entirely to exclude air."

"The most proper situations for dunghills are contiguous to stables, etc., to which may be added others near the house and piggery. The *dung meer* or pit adjacent to the house, may be composed of various ingredients besides dung. Scrapings of the yard, earth, straw, weeds, dung of fowls, soot, ashes, shells, lime and bones, kitchen sweepings, dirty water, suds, brine, urine, etc., etc., all contribute to its richness."

"The dung heap contiguous to the barn and outhouses, may be augmented by soil, mud, weeds, etc. In every case however it will be proper that those ingredients should predominate which are best calculated for the land in which it is to be laid, and which will ferment and decompose as nearly as possible at the same time: for otherwise, one portion may be losing its most valuable qualities, while another is only slowly proceeding towards decomposition, or the whole process may be improperly checked. The process of fermentation however, will not take place so evenly and so rapidly as it ought, unless the heaps are shovelled over once or twice in the course of the summer, in order that the various ingredients may become more intimately mixed and mellowed."

"In the management of farm-yard manure, it is important to guard against its being exposed to the weather. The heap should be kept closely together, and the daily additions placed regularly upon it. Should no farther addition be made to the heap before applying it, the whole may be covered with earth."

"But although exposure to the atmosphere is injurious, the access of water from the roofs of the buildings, etc., is still more so, as directly carrying away the most important ingredients of the heap."

"When a mass of manure, however rich it may be, has remained for a length of time saturated with moisture, it undergoes such a change that no management can induce fermentation, without the addition of fresh manure." On the other hand, want of moisture often induces an imperfect and destructive fermentation, highly injurious to the manure. Hence, if the manure heap is liable to become too wet, it may have a drain leading off to a tank or heap of muck, etc., at a lower level; and heaps of manure in dry situations may be much improved by having liquid matters poured over them.

"Fermentation being farther regulated by the facility of access to the mass, this may easily be regulated by compressing the materials, or placing them loosely together. Heaps formed in autumn or early winter, and not intended for application till spring, may be compressed by discharging the loads from the carts on the heap itself. This is effected by keeping one end low and sloping, and the compression by this means prevents the horses' feet and the cart wheels from sinking in the heap, the unloading on it being attended with much less difficulty than could be imagined by persons unaccustomed to the work. The degree of compression should be regulated by the quantity of manure and the length of time it is to remain. When it is not intended to remain long in the heap, no compression should be applied, but the mass placed together as loosely as circumstances will permit."

"In all cases and under all systems, the objects to be kept in view, are that no refuse, be it solid or fluid, animal, vegetable, or mineral, should be wasted—that the fertilising qualities of the manure should be as much concentrated and retained as possible—that the manure should be so made that it may be preserved as long or as short a time as may be requisite; and so combined and managed that, when applied, it shall be of that nature, and in that condition which will best ameliorate the soil, and promote the vegetation of the crop for which it is destined."

(2.) *Judge Peters on Manures.*

"The first consideration in the management of manures, is to secure them against all waste. On most of the farms in this Island the manure heaps are exposed to the rain, by which the most fertilising parts are washed out, and frequently placed on the side of a hill, so that their dark rich juices, instead of being saved for the crop run off to the nearest brook. This is a common error. To prevent it, the place where the manure is thrown out should be dug out so as to form a pit two, three, or four feet deep, according to its situation; if the bottom will not hold water it should be puddled with clay; during the summer, or in the fall, as most convenient, one or two feet of bog mud, if it can be got, or earth from the road side, should be laid on the bottom of the pit, the manure, when thrown out, will then rest on this mud or earth, which will absorb the juices as they escape, and become as good manure as the dung itself; and what the mud or earth does not soak up will remain in the pit saturating the lower parts of the dung-heap. This will be found, on trial, an improvement on the present system. But there is a further improvement, viz.: the erection of a shed against the side of the stable or cattle-house over the pit, so as to cover the manure when thrown out; this will prevent its being mixed with snow in winter, or washed by rain in spring. It is of great importance in the management of barn-yard manure, that a *gentle* fermentation or heating should be constantly going on in the heap, first, because a certain extent of decomposition is necessary to render the litter it contains fit food for plants; secondly, because by this heating, seeds of noxious weeds are destroyed. If the dung is mixed with snow, and frozen, no decomposition goes on in winter, and the seeds of every weed which grew on the farm are preserved and carried out with the manure, and are thus re-sown in the spring. By having the manure covered with a shed this evil will be avoided, as, though ten or twelve inches of the top of heap thus covered may be frozen, yet even in mid-winter the interior of the heap will maintain sufficient heat to destroy the vitality of the seeds, and gradually to decompose the litter. If, on the other hand, manure which has not been covered, be left till late in the spring, the heat of the weather soon causes it to heat so rapidly, that it becomes too hot; a strong smell will be found coming from it, this is a gas called ammonia, which, though invisible, is the very best part of the

manure, and if preserved, would produce the farmer bushels of turnips, wheat and oats. On opening a heap which has undergone this excessive fermentation a great part of it will often be found "fire-fanged," that is, having a dry mouldy appearance. Manure reduced to this state is of little value; but where dung, by being under a shed, has undergone a gradual decomposition during the winter, this excessive heating, and consequent loss, will be avoided. Boussingault, page 260, on this subject, says:—

"The loss of ammonia from dung-heaps in the course of *regulated* fermentation must not be estimated too highly; when the decomposition is *carefully* conducted the loss is really very small, the gentle fermentation then raised, has characters which differ essentially from those that accompany the rapid putrefaction, which never fails to take place when matters are not well managed. As an example of the rapid and injurious fermentation of which I speak, I may cite that which frequently takes place in piles of horse dung. Every one must have seen such dung hills left to themselves acquiring a very intense heat in the course of a few days, and even heard of their taking fire. I have seen piles of this kind reduced to their mere earthy constituents; such are never the results of the moderate and gradual decomposition which farm-yard dung ought never to exceed. When the pit or stance is emptied, in which a slow and equal fermentation has taken place, the upper layer is seen to be very nearly in the same state in which it was when it was piled, the layer immediately beneath this one is changed in a greater degree, and sometimes exhales a slight ammoniacal odour; in the lower strata the modification is yet greater; the straw has lost its consistency, it is fibrous, and breaks into pieces with the greatest ease: the mass is also proportionally darker in colour as we go deeper, and on the ground is black. There is no doubt but that the state in which the properly managed dung-heap is found in the end, is due to the circumstances in which it has been placed and kept during the whole time of its preparation; its constituent elements would have gone through a totally different course in the progress of their modification, had they been left exposed to the open air."

"The urine of cattle, horses, pigs, etc., is a most powerful manure. "The urine saved from a single cow is considered worth ten dollars per annum in Flanders, where agricultural practice has reached a high state of advancement. The urine of a cow for a year will manure one and a quarter acres of land, and is more valuable than its dung in the ratio by bulk of seven to six, and in real value as two to one. How important, then, that every particle of it be carefully husbanded for the crops."—*Allan's Farm Book*, p. 64. And yet this most valuable manure is very generally wasted in this Island. There are several methods of saving it. One generally practised is to excavate the earth under or near the stables or stalls, and place in it a tank, either made of wood or built of brick, and grouted so as to hold water, and from which the liquid is pumped into a puncheon placed in a cart or on

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wheels, and then allow it to run off as the cart is driven over the fields; various contrivances being used to sprinkle the liquid evenly over the ground. A simple and effective one is to place a board in the tail of the cart, with notches cut in the under edge, by letting the liquid run from the puncheons into the cart it will be equally distributed the width of the cart body as it is driven along. But as the construction of tanks requires an outlay of money, which many farmers cannot afford, a less expensive method seems better adapted to our circumstances. It has been already stated that a pit should be dug by the side of the stables, to receive mud or earth on which the dung should be thrown. The urine is generally wasted by running through the loose floors of the stables or stalls. Now, suppose the cattle stand with their tails toward the pit, all the farmer has to do is to shelve off the earth from under the stable three or four feet, as far as the group extends, so that any liquid falling through will run into the pit. If the cattle stand in a double row, or tail to tail, then, under the whole of the group a drain must be dug leading to the pit, as wide at the top as the group, and narrow at the bottom, and puddled with clay, so that the liquid falling through will gradually flow over the earth or mud placed in the pit; by this means the urine, instead of running under the barn and being lost, will be soaked up by the mud or earth in the pit. This method may be adopted even where the floors are formed of logs. Those who can afford to have tight plank floors, will find it more convenient to let it empty into the pit from spouts under or over the sill, because as the liquid should flow into it over the top of the mud or earth, the pit will then hold a sufficient quantity without being made so deep as it would require to be where the liquid first runs through the floor. By means similar to the above, the writer, last year, obtained 220 loads of manure from the urine of his stock, seven cows and three horses, independently of the manure made from their dung. The following extract from the *Farmer's Treasure*, page 175, both points out the mode of saving the urine, and strikingly illustrates its value as manure:—

“A letter from Charles Alexander, near Peebles, in Scotland, addressed to Sir John Sinclair, in 1812, contains much valuable information on this subject. This intelligent farmer had long been impressed with the great importance of the urine of cattle as a manure, and he set about to discover, by a long and well-conducted series of experiments, the best mode of collecting and applying it. He began by digging a pit contiguous to the feeding stall, but distinct altogether from that which was appropriated for the reception of the dung. The dimensions of the pit were thirty-six feet square and four feet deep, surrounded on all sides by a wall, and the solid contents were one hundred and ninety-two yards. Having selected the nearest spot where he could find loamy earth—and this he always took from the surface of some field under cultivation—he proceeded to fill it, and found that with three men and two horses he could easily accomplish twenty-eight cubic yards per day. When the work was complete he levelled the surface of the heap in a

line with the sewer which conducted the urine from the interior of the building, on purpose that it might be distributed with regularity, and might saturate the whole from top to bottom. The urine was supplied by fourteen cattle, kept there for five months on fodder and turnips. The contents of the pit produced two hundred and eighty-eight loads, allowing two cubic yards to be taken out in three carts, and he spread forty of these on each acre, so that this urine, in five months, produced a compost sufficient for the fertilisation of seven acres of land."

He states, further, that he had *tried* this experiment for *ten years*, and had indiscriminately used, on the same field, either the cow dung or the saturated earth, and, in all stages of the crop, he had never been able to find any perceptible difference. But what is still more wonderful, he found his compost lasted in its effects as many years as his best manure.

It appears, then, that in five months each cow discharges urine, which when absorbed by loam, furnishes manure of the richest quality and most durable effects, for half an acre of ground. The pit which contained all the dung of the fourteen cattle, as well as the litter employed in bedding them, and which was kept separate for the purpose of the experiment, only furnished, during the same period, two hundred and forty loads, and these, at the same rate, could only manure six acres.

From these facts it is evident that the urine which the farmers in this Island waste is actually worth more than the dung which they save, a conclusion which should certainly lead to an alteration in their present practice.

The dung is often drawn out to the fields in March and April, and formed into heaps, where it remains until it is wanted. This is necessary to forward the spring's work, but it is generally left uncovered, and heats before it is carted out for spreading, and thus a great portion of the ammonia—the best of the manure—is lost. Agricola observes :

"A skilful agriculturist would no more think of allowing a violent fermentation to be going on in his dunghill, unmixed with earth or matter to fix and secure the gas, than the distiller would suffer his apparatus to be set to work without surmounting his still with the worm to cool and condense the refined spirit which ascends in evaporation; in both the most precious matter is that which escapes in a gaseous state; and to behold it escaping with unconcerned indifference, is a demonstration of the most profound ignorance."

The *Farmer's Treasure*, page 73, gives the following directions:—"When it is found necessary to cart the manure away in order to forward the business of the season, previous to the commencement of the work, a quantity of peat or soil should be collected on the spot intended to receive the dung. The foundation of the heap should be laid with such material, about six or nine inches thick, according to the nature of the dung to be laid upon it, and it should be rather inclined to the centre, so as to retain as much as possible of the soakage of the heap, the sides should be kept upright and the top level. At the conclusion

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of the hauling, the two ends should be brought up to the general level of the heap, and the whole surface, including the top, sides and ends, should be well coated with the mould, or other material provided for the purpose."

In this Island, the ground being frozen in March and part of April, earth or mud cannot then be got; but the farmer should look ahead—he can make a heap of mud or earth during the summer or autumn to cover his manure with in the spring; the heap should be placed in the lee of a bush or fence, where the snow accumulates, or surrounded with a few bushes or hurdles to catch the snow. I generally prepare a heap of bog mud in this way to cover my manure heaps in the spring; I find it then easily got at, as the frost seldom penetrates the heap more than five or six inches. This mud being coated twelve or sixteen inches thick over the sides and top of the dung heap, retains the ammonia, and becomes as good as the dung itself, and greatly increases the quantity of manure.

Whether the manure be spread over the ground to be ploughed, or put in drills, it should be covered as soon as possible after it is spread, because, by exposure to the sun, its moisture is evaporated, and the dung is left parched and dry, and does not rot so quickly in the soil as when it is ploughed in damp, consequently the crop remains a long time without receiving benefit from it. I frequently see dung spread two or three days before it is ploughed in. If it were old, well-rotted dung, it might not matter so much, but with half rotted dung, made only the winter before, it is a most wasteful practice; correctly speaking, the plough should follow the spreaders; but our practice must be adapted to our circumstances; and few of our farmers can command sufficient hands to do this, but all should remember, "*that every instant it lies exposed to the air, it is losing its value,*" and no one need spread more in the forenoon than he can cover before night.

Bog Mud, of which there is abundance in this Island, is a most valuable manure, but very generally neglected; one frequently sees a farm poor and worn out, its owner complaining he cannot get manure, and yet in the midst of his worn out fields, lies an acre, or half an acre, of mud, from two to five feet deep, containing manure sufficient to make the whole farm as rich as a garden, if he would but use it. An American Agriculturist, speaking of bogs and swamps, says:—"Such reservoirs of vegetable nutrition are mines of wealth to the farmer, if judiciously applied; nor can he justify meagre returns from his fields while this remedy is within his reach." This kind of mud frequently contains an acid quality, and then if spread and ploughed in fresh from the bog, it will be of little or no service to the first crop, and may prove injurious to it; yet, even then, in a year or two, its beneficial effects will be evident, and will be found durable.

But to make it produce prompt and immediate effect, it should be mixed with manure, or lime, or ashes, which may be done in various ways. In mixing it with manure, the plan pursued—suggested to me

by Fessenden's Complete Farmer—is this: I first form a bottom of mud fifteen feet wide and eight or ten inches deep; then lay on a layer of manure about six inches deep; then eight or ten inches of mud; then six inches of manure, and so on, alternate layers of mud and manure, till the heap is about four and a half feet high; the sides, ends and top are then coated with mud ten or twelve inches thick; the manure and mud should be thrown on from each side, and no one allowed to tread on the heap, because, if it is packed too closely, it will not heat so well. The dryer the mud the less manure will be required to cause the whole to heat. I generally make the compost in August or September, and use about one load of manure to three of mud; if not made up till October, I use a larger proportion of manure, as more is then required to produce heat than when the weather is hotter. Early in the spring the heap is turned; it then heats slightly again, and is ready for turnips or other crop, and a cart load of it will be found equal to a cart load of farm yard manure.

In mixing it with lime, I have found twenty barrels of roach lime sufficient for one hundred cart-loads of mud. The lime should be slacked beside the mud, and mixed with it while it is hot; it should remain a year in compost, and be two or three times turned.

Ashes serve the same purpose, and in many parts of the Island are more easily obtained than lime. Dr. Dana, of Massachusetts, recommends eight bushels of unleached wood ashes to be mixed with one cord of mud, which, he says, is equivalent to pure cow dung in value. I have found the following method of preparing this mud cheap and effective:—I draw out the mud and dump the loads near the bog; making the heap about thirty feet wide, leaving it just as it falls from the cart, without levelling; then haul the roots thrown out, in digging the mud, and pile them on the heap; then haul out the moss which has been pulled off the bog in getting at the mud, and pile it on the heap over the roots; in this way it soon dries. I then burn it, and the ashes cover the mud; I then throw in about five feet from each side of the heap, and put on a fresh layer of mud; then pile on more roots and moss, and burn again, and so on, till the pile is as high as I wish it; then turn the whole, and let it lay over the winter. I have treated about five hundred loads of mud in this manner, which seems to me as good as that prepared with lime, while the cost of the lime is saved.

Spreading this mud in the barn yard, or cattle pen, where it receives the droppings, and is trodden by the cattle, is also a good mode of preparing it; but then it is advisable to make it up in a heap for a month or two before it is used, that it may heat.

(3.) *Agricola on Manures.*

“When a country advances, in the progress of improvement, from pasturage to tillage, the various sources of manure are investigated and sought after with an avidity commensurate to the fervent spirit of enter-

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prisc. The attention which is paid to this branch of management, indicates with certainty the state of the art; and wherever we discover little or no exertions made in it, in order to accumulate by artificial means the aggregate heap beyond the ordinary supply, no further proof is requisite of the state of debasement in which agriculture lies. On the other hand, when a vigilant and persevering industry is ever on the alert; when numerous expedients are tried to enlarge the quantity as well as to improve the quality of manures; when composts—diversified both in the ingredients and proportions—become objects of curiosity and experiment; these are the first symptoms of returning life and vigour, and may be hailed as the precursors of more flattering and auspicious prospects. The ardour of agricultural pursuit in England was ushered in by these beginnings: and at the present day, there is no subject of more paramount interest than the augmentation of the dunghill. Every kingdom of nature has been ransacked, to find out substances endowed with the principle of fertility; science has come in to the assistance of art; philosophy has stooped from her dignity, and joined in the general research; and the public interest, instead of having flagged with the very ample success which hitherto has attended the inquiry, has only been roused to more spirited and adventurous efforts. The COMPOST-MIDDENS of Lord Meadowbank, the mixture of soil with decomposable matter, the universal application of lime, and the late introduction of burnt clay, are steps in that great race, in which all men, as if stimulated by one common impulse, seem to have engaged. Indeed, unless other means are resorted to, in order to replenish the waste of vegetation, than the simple contents of the barnyard, Great Britain could not sustain the half of her population, nor draw from her own territorial domains that exhaustless abundance which provides materials for her commerce, and ministers to the necessities, comforts, and luxuries of life. This exuberance of supply may all be traced to the improved and skilful methods, not of cultivation, so much as of multiplying the efficacy of putrescible manures. There was a period in her history when, like this Province, she was more “a grazing than a corn country;” and when butcher-meat bore no sort of relation in price to wheat and other grain. When we review this part of her history, we are struck with the palpable blunders she once committed, and trace, between them and our own, a striking and remarkable analogy. The manures then in use were the simple excrementitious matter of the cattle on the farm, unaided by those compound ingredients which have been since introduced, and which may be considered in the light of the raw materials from which the modern stores are manufactured. In truth, without great attention to the artificial increase of this necessary article, our agriculture can never rise to any importance; and it would be vain to urge the extended culture of white crops, unless we possess the means of repairing the exhaustion of the soil.—It has been long acted on in Flanders, and is now universally acknowledged in England, that an arable farm may be kept in good heart, and subjected to a con-

tinued course of cropping, without any extraneous dung, other than what is made on the premises from the consumption of green crops, straw, and fodder. The cattle which are fed on turnips, the horses employed in labour, the pigs and poultry, are perfectly sufficient to supply such a quantity, under the direction of a scientific manager, as will annually restore to the land that richness of which it is deprived; and at the same time admit the grain to be carried to market, to meet the wants of the community. Every spot, in both countries, can be made to repair its own waste; and the luxuriance of one is never employed to correct the poverty of another. Here our rich marshes and intervalles are taxed, and as it were, laid under contribution, for the benefit and support of our uplands.

In the further prosecution of this subject, I shall point out some capital errors in the management of manure, which prevail, with few exceptions, throughout the whole province, and which have a most pernicious influence on our agricultural progression; and I shall prescribe the remedies which the case suggests, and which are practicable under existing circumstances.

I observe in the first place, that we have almost no pits dug upon a regular plan for the collection and preservation of the dung, which from time to time is wheeled out of the barn. Sometimes it is spread out on the green sward; sometimes cast carelessly in a court, or adjoining yard; but seldom in an excavation made purposely for retaining the juices which run from it. These are suffered either to stream along the surface, or sink into the earth; and in both cases their utility is sacrificed to inattention and ignorance. This is no more, however, than the half of the evil. The exhalations, which arise from the ardent influence of a summer's sun, and from the natural activity of fermentation, are permitted to escape freely, and to carry along with them all the strength and substance of the putrescible matter. No means are taken to fix the gases which are generated, and which constitute the elements of vegetable food. I do not know if there be one solitary instance throughout the wide range of the province, of the application of soil on the surface of a dunghill, to prevent this unprofitable waste and dissipation; and I am too confident, there is none, covering the bottom with a regular coat or layer, to imbibe the manure's moisture. The dung, too, is suffered to rot without any attention whatever to the degree of heat; and I should startle my readers, were I to tell them that the fermentation should never be urged beyond 100° of Fahrenheit's thermometer. At a much lower heat, carbonic acid, carburetted hydrogen, and the other gases of that family, ascend as elastic fluids, and are diffused and lost in the atmosphere. The dunghill becomes what is called FIRE-FANGED, and the principles of fertility are expelled in violation of those chemical laws which regulate and pervade the nature of the subtle particles of matter.

If the dung be injudiciously treated, the urine discharged by the cattle is squandered, and indeed altogether lost. This is owing to the con-

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struction of the barns which generally prevails throughout the province, and which cannot be altered without some little outlay of capital. Being formed of wood, they are mostly raised and propped on a foundation; and a floor of plank is invariably laid. The whole urine of the cattle, except what is absorbed by the dung, finds its way through the seams, and either oozes into the earth, or forms beneath the barn a stink and noisome pool of standing water. The essential elements of vegetable matter with which it is surcharged, assume quickly the gaseous form, and either mount up through the floor or escape by the sides of the building. At all events, their fertilizing qualities are turned to no account, and the loss, from this single circumstance, is ruinous beyond calculation. It may be necessary, in some measure, to ascertain the amount of this mischief, that we may set about correcting an evil of such formidable magnitude, with a vigorous and resolute energy. I should be afraid to hazard my character with the public, by stating in round and unqualified language, the value of this rich juice which is literally wasted, and thrown away; and, therefore, I shall proceed with caution, and give a detail of facts—conclusive in their bearings—and substantiated by the best authority. They are contained in a letter* from Charles Alexander, near Peebles, in Scotland, and are addressed to Sir John Sinclair, in 1812, for publication. This intelligent farmer had long been impressed with the great importance of the urine of cattle as a manure; and he set about to discover, by a long and well conducted series of experiments, the best method of collecting and applying it. He began, by digging a pit contiguous to the feeding stall, but distinct altogether from that which was appropriated for the reception of dung. The dimensions of this pit, according to his own account, were 36 feet square and 4 feet deep, surrounded on all sides by a wall; and the solid contents were 192 yards. Having selected the nearest spot where he could find loamy earth, and this he always took from the surface of some field under cultivation, he proceeded to fill it, and found that, with three men and two horses, he could easily accomplish 28 cubic yards per day; and the whole expense of transporting the earth did not exceed £4 16s. When the work was complete, he levelled the surface of the heap, in a line with the mouth of the sewer, which conducted the urine from the interior of the building, on purpose that it might be distributed with regularity, and might saturate the whole from top to bottom. The quantity conveyed to it, he estimates at about 800 gallons; but as this calculation was founded partly on conjecture, for he measured not the liquor, it will be better and more instructive to furnish and proceed on data, that are certain and incontrovertible. The urine was supplied by 14 cattle, weighing about 34 stone each, and kept there for five months on fodder and turnips. The contents of the pit produced 288 loads, allowing two cubic yards to be taken out in 3 carts; and he spread 40 of these on each acre, so that this urine in five months, and from fourteen cattle, produced a compost

*Farmer's Magazine, vol. 18, page 78.

sufficient for the fertilization of seven acres of land. He states further, that he had tried this experiment for ten years, and had indiscriminately used in the same field either the rotted cow dung, or the saturated earth; and in all the stages of the crop, he had never been able to discover any perceptible difference. But what is still more wonderful, he found that his compost lasted in its effects as many years as his best putrescent manure; and he therefore boldly avers, that a load of each is of equivalent value. Conclusions of vast importance are deducible from this statement, and I cannot resist the feeling of placing them in a strong and advantageous light. They speak a volume of instruction; and if we are willing to learn, they must lead to a very material alteration in the construction of our barns. It appears, then, that in five months each cow discharges urine which, when absorbed by loam, furnishes manure of the richest quality, and most durable effects, for half an acre of ground. The dung pit, which contained all the excrementitious matter of the 14 cattle, as well as the litter employed in bedding them, and which was kept separate for the purpose of the experiment, only furnished during the same period 240 loads, and these, at the same rate, could only manure six acres. The aggregate value of the urine therefore, when compared with that of the dung, was in the ratio of 7 to 6; so that we are borne out by these premises in this extraordinary inference, that the putrescible liquor which in this province, and under the management of our farmers, is wasted and annihilated as far as regards any useful purpose, is intrinsically worth more than the dung, as an efficacious and permanent dressing; and if we take into consideration, that this latter manure is not treated with any skill and judgment, it will not seem surprising that the culture of white crops has never been carried here to any extent since we have despised and neglected the only means of creating them.

These defects call aloud for amendment. No country is entitled to be styled agricultural, where the fundamental maxims of the science are so outrageously violated, and where the prevailing practice sets at nought the simplest rules of the art. Grazing draws forth no energies of the mind; it is compatible with indolence, stupidity, and a gross ignorance of all principle; the Arab in the desert can tend his flocks and herds, and leave their multiplication to the instinctive appetites of nature; it is only the first step from the savage life, and in place of hunting for the prey which he devours, man tames and domesticates the lower animals, but leaves their increase, their subsistence, their diseases, to the unguided agency of natural causes. 'Tis the plough, which awakes his dormant faculties, and stimulates to industry. Like the Sovereign of the creation, he commands, and is obeyed; he speaks, and it is done. The weeds, which are the natural inmates of the soil, disappear at his bidding; the grasses spring up, and form a carpet for his feet; the corns are subjected to his power, and wave their loaded ear around his dwelling; the forest gives up its fruit trees, to load his table with their luscious products; and the features of a rugged and forbidding territory

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are transmuted into the beautiful and sublime, and soften under the influence of his transforming smile. This Province is still in a rude and unsubdued state; and its husbandry partakes of its general character. For this, it is not difficult to account. Emigrants of all trades, of all habits, and of all ranks of society, land on this foreign strand in quest of subsistence. Manufactures are the offspring of civilization, and of the accumulation of wealth; and cannot find their way but into an old country, abounding with resources and population. Here we have none, and cannot have them for a century. The unfortunate stranger driven from the only stay on which his hope rested, seeks refuge from despair by plunging into the forest, and cultivating the soil to answer the cravings of indignant nature. Without skill, without capital, without the benefit of instruction, he becomes a self-taught farmer, ready to run into every blunder which ignorance has invented, and to which the vicious culture of the country has lent the sanction of authority. His hut, his barn, his implements of husbandry, his seed, his stock, are all chosen without knowledge, and continued in use without the least exercise of the understanding. He has no landlord to exact a rent, no government to levy taxes, no rival to animate industry. He soon rises above want; the spontaneous productions of the soil yield him a scanty subsistence; the luxuries of life are seen only at a dim and indistinct distance; and his faculties thus lulled asleep by surrounding circumstances, fall into a state of torpid lethargy. He must be stirred up, aroused, and forced into action. This is the province of superior and exalted characters, who from their elevated rank in society, preside over his destiny. To them a rich reward of gratitude is due; and their memory shall descend to posterity, embalmed by the blessings of a present generation. We are approaching an eventful epoch; the public attention is excited; we are prepared to count over the catalogue of our past errors; we are panting after knowledge; and a new age—full of promise and pregnant with improvement—is arising on our desolate and forlorn prospects.

During this state of public feeling, the evils which I have pointed out in our treatment of decomposable manures, cannot long remain without correction. The remedies are not only simple, but accessible to every farmer of moderate capital; and the whole expense of the improvement will be compensated by the first, or at most, the second year's saving.

Ist. With respect to the formation of a dung pit, I would recommend that a place be chosen near the barn, which should be dug about three feet deep, and of a size proportionate to the stock of cattle usually kept by the farmer. It is not necessary that it should be built round with a wall, or have a perpendicular descent, as it may slope gently inwards, and deepen gradually towards the centre. After it is thus hollowed out, the texture of the bottom should be examined, and if found firm, impervious, and capable of containing the juices, no further trouble is requisite, and the work is complete; but, if open and porous,

it should be coated with clay, and lined with large and coarse flags. Into this pit, earth from some neighbouring field, should be first brought and strewed over the bottom and sloping sides, to the thickness of from 9 to 12 inches. Thus a safe depository will be prepared, for the cleanings of the barn, for waste straw and weeds, for the sweepings of the kitchen, for the stems of peas, beans, cabbages, potatoes, and in short all vegetable matter of woody fibre, as well as for the dung of the feeding cattle. After a complete layer of putrescible matter has been spread all over, and when the symptoms of an active fermentation have become visible, the earth, which was thrown out of the excavation, may be slowly returned and scattered on the surface of the heap, to catch the exhalations which are ascending. Hither, too, the urine should either be conducted by a drain, or carried by buckets; for it is an unpardonable waste to lose the benefit of this rich invigorating manure. The earth which lies at the bottom will greedily drink up the urine and the vegetable juices, and thus gain a large accession of nutriment and value. So soon as the pit is filled up in the manner herein described, it should be emptied of all its contents; and these should be carted to the field where they are meant to be afterwards applied, and there laid down in some convenient corner, to be mixed up and sorted into a profitable compost. The pit, adjoining the barn, may be again lined with mould, and the former operations repeated in procuring and augmenting its contents.

According to this plan every farmer, at the first opening of next spring, should cart out his dung, and form it at once into a composite pile, which, if skilfully managed, will gather heat, and undergo the process of fermentation before it will be needed in seed time. He should then instantly set about the digging of his pit, and the other alterations on the barn which are indispensable to the successful collection and preservation of his future manure. During summer this pit should be emptied twice or thrice according to circumstances; and its fermentable and earthy materials transported to the ground which they are destined to fertilize, and there subjected to a new process. Towards the fall, which by its length and mildness makes amends for the advantages of more favoured regions, all those compost heaps as well as the dung about the barnyard, should be spread on the land, which is meant to be immediately ploughed. In the mean while, an additional stratum of mould should be distributed along the bottom and sides of the pit before the approach of winter, and during that rigid season the dung may be accumulated without any extraordinary care, as the intensity of the cold is unfavorable to putrefaction, and little loss will be sustained from the dissipation of the gaseous matter. Such farmers who may choose to be the trouble, and have suitable convenience of earth sheds, may pile up beforehand a quantity of dry earth, which may be scattered over the dunghill in the depth of winter, on such places as indicate a strong fermentation.

2nd. These remarks and general reasonings will have prepared my

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readers for the sentiments I must express regarding the construction of our barn floors. They are the objects of my unqualified condemnation as an agriculturist, of my sincere regret as a friend of the country; and of bitter and deep bewailing as the anxious promoter of our future and rapid advancement. Reform here cannot be effected without considerable cost; and I anticipate adherence to existing errors, notwithstanding the soundness of the conclusions, and the manifest utility of a change. I must, however, cling to the hope of receiving at least a limited and partial obedience; and I request my well-wishers, who have animated me in my course, and borne up my spirits in the midst of difficulties, to listen to the call, and set the first yielding example. The increase of valuable manure will be incalculably great; and the solid benefits will vastly outweigh the trouble and expense. I see only one plan by which this evil may be effectually obviated; but as there is a choice in the materials to be employed, such may be selected as are most accessible in any particular district. After tearing up the planks, and building the foundation round and round close to the sills, the void space below the flooring should then be filled and packed firm with earth. As there will be a necessity to cut away all the present sleepers or joists, which, besides supporting the planks, bind and unite the two sides of the frame, pieces of square timber may be stretched across the whole breadth and at a lower depth, and be secured to the bottom of the sills, either by a mortise, or by driving down a round iron bolt. By this means the strength of the frame will be preserved unimpaired; and the operations may proceed without endangering the structure. The earth should then be filled in, till it rises to the level of the present floor, and it should be beaten down by a heavy mallet, till it is completely consolidated. A stratum of clay should be next laid over the whole surface, by which the moisture may be retained and hindered from escaping through the earth.

After dividing the interior into its respective compartments, the arrangements must proceed according to the use for which each part is designed. The stalls for the horses and cattle claim a distinguished share of attention. The fore feet of the animal should stand on higher ground than the hind, and there should be in every stall a gradual declivity backward, terminating in a gutter, in order to carry off all liquid matter. To this gutter an easy descent should be given outward, that all the urine may flow towards the pit on the outside of the building, which I have described as the great reservoir of this putrescible stream. The floor of each separate stall, as well as the gutter, may be laid with plank while the clay is soft and yielding, and every seam and interstice may be closed up by the same substance. These planks, thus pressed and imbedded in the clay, may be nailed and secured to transverse beams running along the length of the barn, and so adjusted as to preserve a sloping direction in the feeding stalls and gutter. But in every case where stones are within the reach of the farmer, they are decidedly superior in firmness, durability, and usefulness; and paving

the floor with them, although perhaps a little more expensive in the first instance, will in the end much better answer his expectations. The stalls should be laid with them exactly in the manner in which Water-street here has been lately improved; and the gutter may be formed either of similar materials, or preferably of smooth flag-stones, like those forming our foot pavements.

The adoption of these improvements in the disposition of our barns will give a mighty impulse to agriculture; the urine and vegetable juices, which are now lost and dissipated, would multiply the powers of fertility; and the extended cultivation of white crops from the wonderful increase of putrescent manure, would be propelled with a celerity proportioned to the ardent hopes of the country."

Young, in his letters of Agricola, was the first writer who directed the attention of farmers in this province to the use of *peat* or swamp muck in the preservation of composts. His method, which has been successfully practised by many farmers, well deserves to be republished.

"It would be unjust to deprive Lord Meadowbank of the well-earned honour of having been the first who investigated and ascertained, on scientific principles, the immense value of this species of manure. That learned judge, perceiving that peat was entirely composed of vegetable substances endowed with an antiseptic virtue, or "a capacity of resisting putrefaction," instituted a philosophical inquiry into the nature of this singular quality, and the manner in which it might be overcome. From his extensive chemical knowledge, and his diligent and painful researches, he found that this antiseptic power owed its origin to the acids, and the astringent principle of tan: and as these were reduced, in succulent and fresh vegetables, by the hot fermentation to which they were exposed in the full career of putrefaction, he wisely concluded that the same cause would produce in peat the same effects. After varying his experiments in the course of six years, he published the results in a pamphlet, which he distributed gratis, and thus acquired to himself an immortal name in the records of Scotch Agriculture. The compost middens of Lord Meadowbank will be known and recollected by the latest posterity, when the decisions which he passed on the Bench, of which he was the prop and ornament, shall have worn away by the corrosive touch of oblivion. The peat to be used, according to his lordship's directions, may be taken, either from the top or bottom of the bog; but the turfy parts ought to be laid aside, as most unsuitable for the operation. After being thrown out of the pit, it should lie for some weeks till drained of its moisture, and then be transported to the field where the compost midden is to be formed. The proportion of the ingredients should be one ton of dung to three of moss; but although these were the proper quantities with the materials which his lordship employed, it has been found from experience that other proportions may be safely and judiciously adopted. In fact, the mixture should depend on the nature both of the dung and peat which

are to be compounded. Horse dung produces a more violent fermentation than that of cows, and will therefore suffice to decompose a larger quantity; and its power in this respect will also be regulated by its own stage of putrefaction: for, if fresh, the heat will be more rapid and much stronger than if old and rotten. The nature of the peat, too, must also be taken into account in assorting the ingredients. Some is a pure vegetable body, free of extraneous matter, from its being formed on an elevated situation; other, again, contains a mixture of earth, which renders it brittle, inadhensive, and putrescible; because it has originated in a patch of low land, or in the corner of some meadow, liable to be occasionally overflowed from the high grounds. When it accumulates in such hollows, its texture is broken by the primitive earths suspended in the turbid waters, with which it is flooded; and in place of exhibiting a matted and organic structure, it resembles the consistency of paste, and is more a fluid than a solid body. Such peaty matter may at once be carted to the arable field, and used as a manure without any preparation; and if thrown into a compost *midden*, six loads of it will be easily fermented with one of dung.

But peat is not generally of this character; and rules of composting must be laid down as applicable to this substance, commonly found of a tough and indestructible contexture. As soon as it is dug from the pit it should be spread out to dry, but not to harden in the sun; for if, by exposure to drought, it changes into a firm, adhesive lump, fit for fuel, it is almost impossible, by any known means, to induce afterwards the putrefactive process. When it is, therefore, about half dry, it should be carried to the midden, and first of all laid regularly along the bottom six inches deep, to constitute the first stratum. This should be succeeded by ten inches of dung, then six of moss, four of dung, and so on, till the latter is exhausted. Above the whole, a layer of moss should be spread to raise the midden to the height of four feet, and all the materials, from the very beginning, should be piled up in the loosest state, to encourage an incipient fermentation, which comes on, sooner or later, according to the state of the weather, and that of the component parts. It is at this time that the principal skill and care of the operator are called for, to mark and ascertain the progress of the compost; for so soon as it approaches to blood heat, it ought to be watered and turned over, with a new mixture of grass, to prevent the dissipation of the useful gases. After the temperature has subsided, the whole mass should be broken up, commencing at the one end, chopping with the spade all the bulky materials, and mixing them in the most perfect manner. A new hill, exactly resembling the last, should be formed on the same principles, adding either moss or dung as the state of the fermentation indicates; and after a second heat has been generated, which in a few days will become apparent, the heap should be suffered to cool, and it will be instantly ready to apply to the ground: but the longer it remains in the midden, the decomposition will be more perfectly effected, and the elementary principles of vegetation more

freely disengaged. In summer, the whole preparation may be finished in eight or ten weeks; but in winter, no injury will be sustained by keeping the materials in compost till the opening of the spring. Three tons of moss to one of dung would in this country, I fear, form an unfermentable compound, from the superabundance of cow-excrement, which is of a cooling nature, and less liable to violent heat: and on that account I would depart a little from the ordinary rule, and recommend two loads of dung to five of moss, which I do with some diffidence, as I am not in possession of any experiment of the kind that has been tried in this province, although it is clearly deducible from the principles laid down. It cannot, however, be a difficult task to discover the just proportions of the ingredients, as the process itself will soon teach an attentive observer, and lead him infallibly to the proper mixture. He has, on the one hand, to guard against excessive heat, which can always be checked by adding peat; and on the other, to bring on an active fermentation, which can be accomplished by enlarging the quantity of dung. A slight experience will very soon instruct our farmers in the due medium; and as I have been at pains to set forth the governing principles of the art, the plainest dictates of the understanding will be a sufficient guide in all cases of composting.

It will not, I believe, be unacceptable to my readers to insert here an extract from the small treatise of the learned judge, which was printed and distributed very extensively for behoof of the Scottish peasantry; and I do this the rather, because the subject, on account of its novelty and repugnance to common ideas, may be received with some distrust, unless conveyed in the very words of the author.

'Let the peat-moss, of which compost is to be formed, be thrown out of the pit for some weeks or months, in order to lose its redundant moisture. By this means, it is rendered the lighter to carry, and less compact and weighty, when made up with fresh dung, for fermentation; and accordingly, less dung is required for the purpose, than if the preparation is made with peat taken recently from the pit. The peat taken from near the surface, or at a considerable depth, answers equally well; and the more compact the peat, and the fitter to prove good fuel, so much the more promising it is to be prepared for manure.

'Take the peat-moss to a dry spot, convenient for constructing a dunghill, to serve the field to be manured. Lay the cart-loads of it in two rows, and of the dung in a row betwixt them. The dung thus lies on the area of the compost dunghill, and the rows of peat should be near enough each other, that workmen in making up the compost may be able to throw them together by the spade. In making up, let the workmen begin at one end; and, at the extremity of the row of dung, (which should not extend quite so far at that end as the rows of peat on each side of it do,) let them lay a bottom of peat, six inches deep, and fifteen feet wide. Then throw forward, and lay about ten inches of dung above the bottom of peat; then four or five of dung; and then cover it over with peat at the end where it was begun, at the two sides,

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and above. The compost should not be raised above four feet and a half high, otherwise it is apt to press too heavily on the under parts, and check the fermentation: unless the peat, when dry, be very puffy and light, and then a much greater height is desirable. Neither should it be much lower, otherwise it will prove wanting in the compactness, and soon also, if the weather is very dry, in the moisture required for the ingredients of which it consists, to act chemically on each other. When a beginning is thus made, the workmen will proceed working backwards, and adding to the column of compost, as they are furnished with the three rows of materials, directed to be laid down for them. They must take care not to tread on the compost, or render it too compact; and of consequence, in proportion as the peat is wet, it should be made up in lumps, and not much mashed or broken.

In mild weather, seven cart-loads of common farm-yard dung, tolerably fresh made, is sufficient for twenty-one cart-loads of peat-moss; but in cold weather, a larger proportion of dung is desirable; at least it is prudent to omit putting any peat between the two upper layers of dung, and rather thicken the outer coat with peat. It is also proper in winter, if ground with a dry bottom can be conveniently employed for the purpose, to increase greatly the breadth of the dunghill, which, in that case, may be done without any limit, by adding, all round the dunghill, circles, consisting of layers of dung and peat of seven feet in breadth. And if the mass of the dunghill is thus enlarged, there is little occasion to exceed the proportion of dung recommended for making up to prepare in the milder season, especially if a covering of coarse vegetables of any sort, such as waste hay or straw, rushes, broom, or furze, or brushwood of evergreens, is thrown over the dunghill. In fact, a covering of this sort is scarce less useful in summer to prevent the escape of moisture, than in winter to exclude cold.

To every twenty-eight cart-loads of the compost, when made up, it is of use to throw on above it a cart-load of ashes, either made from coal, peat, or wood; or if these cannot be had, half the quantity of slacked lime may be used, the more finely powdered the better. But these additions are nowise essential to the general success of the compost, provided a sufficiency of time is allowed to the preparation to compensate for the want of them.

The dung to be used should either have been recently made, or kept fresh by compression; as by the treading of cattle or swine, or by carts passing over it. And if there is little or no litter in it, a smaller quantity will serve, provided any spongy vegetable matter is added at making up the compost, as fresh weeds, the rubbish of a stack-yard, potato-shaws, sawings of timber, etc. And as some sorts of dung, even when fresh, are more advanced in decomposition than others, it is material to attend to this; for a much less proportion of such dung, especially if abounding in animal matter, as is less advanced, will serve for the compost, provided care is taken to keep the mass sufficiently open, either by a mixture of the above mentioned substances, or, if these are wanting,

by adding the peat piece-meal, that is, first making it up in the usual proportion of three to one of dung, and then, after a time, adding an equal quantity, more or less, of peat. The dung of this character, of greatest quantity, is shamble-dung, with which, under the above precautions, six times the quantity of peat, or more, may be prepared. The same holds as to pigeon-dung and other fowl-dung; and to a certain extent also, as to that which is collected from towns, and made by animals that feed on grains, refuse of distilleries, etc.

The compost, after it is made up, gets into a general heat sooner or later, according to the weather, and the condition of the dung; in summer, in ten days or sooner; in winter, not perhaps for many weeks, if the cold is severe. It always, however, has been found to come on at last, and in summer it sometimes rises so high as to be mischievous, by consuming the materials, (fire-fanging). In that season, a stick should be kept in it in different parts, to pull out and feel now and then; for if it approaches to blood-heat, it should either be watered or turned over; and on such an occasion, advantage may be taken to mix it with a little fresh peat.* The heat subsides after a time, and with great variety, according to the weather, the dung, and the perfection of the making up of the compost; which then may be allowed to remain untouched, until within three or four weeks of using, when it should be turned over, upside down, and outside in, and all lumps broken: then it comes into a second heat, but soon cools and is fit to be taken out for use. In this state the whole, except bits of the old decayed wood, appears a black free mass, and spreads like garden-mould. Use it weight for weight, as farm-yard dung, and it will be found, in a course of cropping, fully to stand the comparison.

Hitherto I have treated the subject as if excrementitious matter alone possessed the power of effecting and accelerating the putrefaction of moss; and it was this view which Lord Meadowbank chiefly impressed at first on the public attention; but many other substances, he afterwards discovered, are endowed with this same capacity. Here my general theory of putrescent manures receives a collateral and happy confirmation; for it is now found, from a thousand repeated trials, that all animal and vegetable substances which are capable of being converted by decomposition into the food of plants, are also capable of operating on peat earth, of dissolving the charm of its incorruptibility, of expelling its poisonous and antiseptic qualities, and of transmuting it into a most efficient manure. Hence putrid water, the juices of the dunghill, the expressions of the cheese-press, the washings of milk vessels, soap suds, the oils and juices of green flax, urine of all descriptions, succulent vegetables and weeds, dead animal bodies, refuse of fish, night soil, sea weed, are all invested with the property of generating heat, and assisting the fermentation of peat; and composts may be formed with all

* In June, 1796, a compost was formed only 2½ peat to 1 dung; it heated in July beyond the measure of a thermometer graduated at 110°. Part was allowed to stand, part turned over with a half more moss. Three weeks after, (18th August,) the heat of the former had descended to 84°, while that of the latter had got up to above 110°.

these different ingredients. The carcass of a dead horse which is often suffered to pollute the air by its noxious effluvia, has been happily employed in decomposing twenty tons of peat-earth, and transforming it into the most enriching manure. This wonderful discovery has exalted the swamps and fens into some degree of agricultural importance; and promises a new era in the multiplication and production of white crops. The fertilizing virtue of dung is increased quadruple by blending it with this inert matter, and Lord Meadowbank, after a long and watchful experience, declares that the powers and duration of this species of compost, in every diversity of soil, have given returns nowise inferior to the best barnyard dung applied in the same quantity, and states expressly that it is equal, if not preferable, in its effects for the first three years, and decidedly superior afterwards.

There are several other views of this subject highly interesting to the farming class, upon which I dare not at present enter, as my letters on putrescent manures have already swollen much beyond my original limits, and I must leave the additional matter to some future day, when I may retrace this path of inquiry. I shall deduce one or two practical observations.

1. In a country like this, where there are no large towns, except the capital, whence the farmer can draw manure, our swamps and bogs offer an inexhaustible supply of this useful and indispensable article. Compost middens form an object of prime importance, and wherever they have been adopted as part of farm-management, they have been followed by results of a most flattering and profitable nature. They tended to multiply the productions of the earth, to elevate the hopes of the husbandman, and to give a new impulse to his useful labours. Here they would not only be productive of all these effects, but they would arrest the progress of our morasses, by subjecting them to a waste gradual and constant; and they would introduce our farmers to an acquaintance with more successful modes of augmenting manure, so essential to the extended cultivation of white crops.

2. According to the practices which have obtained in this Province, we have not above one ton of manure applied to our fields for ten which, from the same stock of cattle, are produced in England; and of course we are not able to cultivate here, with the same means, above one acre in ten which are there under the plough. To such as have given due attention to the previous details, this conclusion, which looks so violent and extravagant, can be established by the most ample evidence; and is quite irrefragable, without denying the premises which have been built both on facts and philosophy. First of all, the one half of our putrescible matter is lost entirely by the waste of the urine; and the other half—the dung—is grossly mismanaged either by the escape of the rich nutritive juices from the dunghill, or by suffering the putrefactive process to be carried to an extreme length. This is not all: that dung, if composted with peat, would in most cases be augmented four-fold; and the quality and duration of the mixture are

superior, at all events equal, to the principal original compound. Four tons of manure, then, may be produced from one of dung, and four tons also may be formed from the urine discharged by the cattle in the same given time. In a course of experiments by James Arbuthnot, Peterhead, he found 'that 300 cart loads of moss could be decomposed by drenching it with 440 gallons of cattle urine. The foundation of the dunghill was laid one foot deep with moss, and 150 gallons of the liquor thrown upon it. The fermentation came on instantaneously, attended with a hissing noise; the other two layers were then put on, the one after the other, sprinkled each with the urine, and the same effect was produced. Eight days after the midden was turned, and to all appearance super-alkalized.* It would seem then that both the urine and dung, discharged in any given time, are of equivalent value; that each of them, if separately applied to peat, or moss, as it is expressed by Scotch writers, would prepare a quadruple amount of rich and valuable manure, and consequently, as the one here is lost from the construction of our barns, a load of dung is all we have for eight of compost, which could be produced from the combined efficacy of urine and excrementitious matter.

If we take further into account the putrefactive qualities of sea-weed, of dead bodies, either horses, cows, or sheep, of common weeds, and of many other substances; I say, if we take into account the power of these in decomposing peat-earth, my general statement will not appear exaggerated, that in this Province we have not above one load in ten, which might be procured to replenish the exhausted energies of vegetation. But taking it for granted that, with a view to strengthen my argument, I have magnified the amount of our loss, and that we could only increase our manures six times above the present quantity, this concession calls loudly for reform, and explains, to the satisfaction of every common understanding, the mystery of our agricultural poverty. We fling away contemptuously the blessings of Nature and of Providence, and instead of blaming our own ignorance and neglect, we curse the climate and the soil, sit down contented with our present dependent situation, and despair of elevating that country on which we tread, and which imparts to us the pleasures of existence, to its proper rank in the scale of national importance."

[For additional facts on manures, and especially on those which are not strictly of animal origin, I may refer the reader to my "Contributions toward the Improvement of Agriculture," where the subject is somewhat fully treated.—ED.]

4. *Rotation of Crops.*

The following is extracted from Peters' Hints to the Farmers of Prince Edward Island:—

"Rotation of crops is to grow different kinds of crops in succession,

* Farmer's Magazine, vol. 10, p. 403.

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on the same field—such as roots, grain, and grass. To lay down any particular course, to be followed by all, would be absurd, for, as observed by Allen, the proper system of rotation any farmer should adopt must depend on all the circumstances by which he is surrounded, and must vary according to those varying circumstances. Though the chief object in introducing the subject here is to point out one great and common error in our present system, yet, as the reasons which render it necessary, and the principles which should guide the farmer in selecting his rotation, should be understood by all, they may be here briefly adverted to. It has been discovered that every crop takes away from the soil certain quantities of nutritious matter, without which there would be no crop; and that no two different crops abstract these nutritious matters in the same proportions. For instance, the turnip takes away from the soil a large quantity of one kind of nutritious matter—wheat a large quantity of a different nutritious matter, and hay a large quantity of nutritious matter different from both turnips and wheat; therefore, though a field may give a sufficiency of that kind of nutriment which is principally required by one crop, yet if another of the same kind immediately follows, there will be a deficiency for it; but if a different crop succeeds, there will be found enough of all the materials it needs fully to manure it; and when a third crop of another description follows, which requires nourishment different from either which have preceded it, the soil may be in a condition to yield a good crop of the last also. But as every crop takes away more or less of all the nutritious matters which the soil contains, if a succession of crops (no matter how different the kinds which succeed each other may be) are gathered and carried off the land, without the occasional addition of manures, they will be found gradually to diminish in quantity till they reach a point (which, under the same system, many farms in this Island have long since reached) when they will scarcely pay the expense of cultivation. But the great error here, and to which I desire particularly to direct attention, is the cutting hay for years in succession on the same land; it is this practice which has ruined half the lands of the Island, and will impoverish the farm of every man who perseveres in it. It seems generally laid down in those countries where great science and great experience have combined to ascertain what is best, that on light soils, such as this Island, two successive crops of hay should not be cut on the same field; or if a second crop is taken, the field should receive a top dressing the previous autumn or spring. I know the danger of saying this. Many will exclaim: It is impossible for us to do it—where can we get manure? and if we had it, how can we dress so much land? what would we do for hay to feed our cattle? what folly to recommend a system which the circumstances of the country will not permit the people to follow! and under this impression will, perhaps, throw away the book, determined to persevere in the present ruinous system. But withhold your condemnation for a moment. I am aware that even a bad system cannot, without inconvenience—

perhaps loss—be entirely changed at once; it would not be prudent to attempt it, and I do not advise you to do so. There is no harm, you must admit, in showing what other countries, with soils similar to our own, have found best; nor is the difficulty of at once adopting it any reason why we should not make gradual approaches towards it. And let us see whether the difficulties are really so insurmountable as they may at first appear.

First, as to where you are to get manure, I would refer you to the first chapter, and ask you if you are guilty of the neglect, or permit any of the waste there pointed out; if so, correct it before complaining on that head. Secondly, I would urge you to recollect that one acre in good heart will yield as much hay as three in bad; the labor, therefore, of giving a light dressing (say twenty to twenty five loads) of mud and ashes, or mud and lime, or mud and urine, or dung compost, would not be so great, when you have to go over only one acre instead of three. Thirdly, consider whether you really require so large a quantity of hay. If you cultivate a large breadth of turnips, you will have a large quantity of straw from the succeeding grain crops; straw and turnips will keep cattle as well as hay; and much better than the red top and natural grass which forms a large part of the hay cut on worn out lands. It will also suggest itself to you, that by turning the field to pasture before it is exhausted, the herbage will be greater in quantity and richer in quality, the cows give more milk, the dairy yield more and better butter and cheese, the young cattle grow more vigorously, attain their full size earlier, and make more beef, the mutton be fatter, and both draw more money from the butcher; and, though last, not least, your land will be improving, instead of getting worse. These advantages should be fairly placed to the credit of the new system, before you resolve to continue the old.

The remarks of Professor Johnston in his report on the Agriculture of New Brunswick, are so applicable to this subject, that I cannot do better than transcribe them here. He says:—

‘As regards his crops, the New Brunswick Farmer follows a system, which, even where regular manuring is practised, would injure the land, and which is therefore condemned and avoided by all good farmers; but which, combined with the waste of manures and neglect of manuring, is certain to entail an early exhaustion. I mention particularly the *repeated successive crops of hay* which are taken year after year from the fields.’

‘This custom, which is characteristic of these North American Provinces, and has been naturally fallen into in consequence of the necessity of providing a large supply of winter food for the stock, is very injurious to the land. This, I believe, is generally acknowledged; but the plea of necessity is urged as an excuse. It is not necessary to cut hay off the same land year after year, without returning to it any manure; neither is it necessary to feed stock altogether upon hay. I infer that the land of this Province, when fairly treated, must be prone

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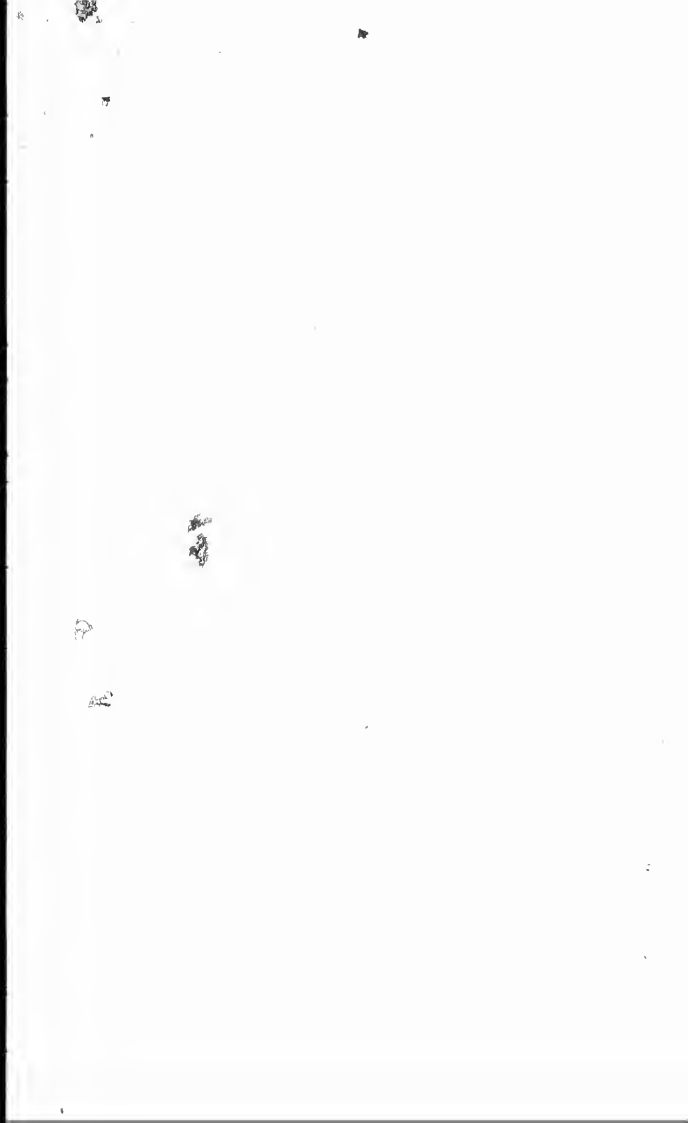
to produce abundantly, from the large returns which the farmers expect, and actually rob the soil of, after once manuring. I visited the farm of a most intelligent gentleman, one of the best farmers in his neighbourhood, and I believe most desirous to improve, who informed me that, after one dressing with mussel mud from the sea bank, not far from his farm, he had taken one crop of potatoes or turnips, one of wheat, and *eight successive crops of hay*—and he seemed to think that the land had used him ill in not having given him more. For the first four crops from such an application, a British farmer would have been thankful and content; and in taking them, he would have been thought rather hard upon his land too.

'*The repeated succession of crops of grain* is open to similar reprobation. In remote districts of Scotland and England, the practice may be found still lingering; but it brings on ultimately a species of exhaustion, which is exceedingly difficult and expensive to remove.'

'*The want of a rotation of crops* is evident wherever the above-mentioned practices, of taking successive hay or grain crops, prevail. But generally, throughout the Province, the neglect of a proper and profitable rotation must be reckoned among the defects of the prevailing husbandry; wherever the system of regular and copious manuring takes root, as an indispensable means of melioration, a well considered rotation of crops must accompany it, if the full benefits of good manuring are to reward the farmer's labors.'

The rotation in general best adapted to this Island—varied, of course, according to circumstances—would seem to be, after lea ground is broken up: first year, oats; second year, turnips, carrots, parsnips, potatoes, or Indian corn, with manure; third year, wheat or barley, with grass seeds; fourth year, hay;—if the land is top-dressed the previous spring or autumn, but not otherwise, fifth year, hay also; sixth, seventh, and eighth years, if required, pasture; and then break up and commence again—with oats; when the ley is old and stiff, oats are often taken the second year also, and the second crop is often better than the first, owing, probably, to the cold in winter not allowing the sod to decay in time to give full nourishment to the first crop. This practice, though contrary to the general rules of good husbandry, may, under the peculiar circumstances, properly form an exception to the general rule: it should, however, be cautiously followed, and never adopted unless the sod be old and stiff, and then it would be better to follow the oats with rye—a crop which should be more generally cultivated, as it does not require strong land, and, if wheat fails, will furnish the farmer with excellent bread.

Grass seeds, particularly red and white clover, should be liberally sown with grain, else both the subsequent hay crop and pasture will be deficient. No one should sow less than six lbs. of red clover, and two of white, in addition to timothy, per acre—and double the quantity will do no harm. Red clover takes a great deal of its nourishment from the atmosphere, and its large roots, when they decay, tend greatly to



improve the soil; and without white clover, pasture will not be what it ought."

A very interesting account of the experience of a Canadian farmer in following out a scientific rotation, will be found in the Appendix to the "Contributions." It is matter of gratulation, that the principles of the rotation of crops are so much more generally understood and practised in this province than formerly; but there is still much to be learned.

5. *Agricultural Reports for Nova Scotia.*

It may be asked, why has not a collection of the methods of the best Agriculturists in Nova Scotia been incorporated with the matter contained in this pamphlet. To form such a collection would at present be very difficult; but the writer is fully convinced of its utility, and would respectfully suggest the following simple method, by which the best agricultural experience of our country might be treasured up for the general benefit:—

At all cattle shows and agricultural exhibitions, let it be announced that every exhibitor must hand in to the judges a written statement of the processes employed in the production of the article or animal exhibited by him; and let the practicability of the method, as a profitable means of production, be taken into consideration in awarding the premium. Let the statements of the successful competitors be forwarded to the Central Board of Agriculture, and published and circulated in their Annual Report. This practice is extensively adopted in the United States; and I find in the preface to the last volume of the *Agricultural Transactions of Massachusetts*, that its still more general adoption is strongly recommended. "It is clear," says the Secretary of that State, "that from these reports and statements the agricultural community derive no inconsiderable benefit; and that from them arg to be drawn such general principles and deductions as will aid the progress of agriculture. It is only by thus recording and publishing facts and experiments that they become available to all. The advantages of such a practice would seem to be so obvious, and the obligation to observe it so imperative on the societies receiving the State bounty, that it is a matter of regret that any society should fail to adopt it. * * * But we could go even further than this; such returns should be made compulsory, under penalty of a forfeiture of the annual gratuity given by the commonwealth."

As specimens of the statements furnished in Massachusetts, I give the following, which have been selected principally on account of their shortness. Many of them are much longer and more elaborate.

Richard P. Waters's Statement.

"I offer for premium a crop of carrots, raised on one hundred and twenty square poles of land. By careful measurement, the product

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was four hundred and forty-baskets; a basket weighs sixty-four pounds, amounting to more than fourteen tons, and making about nineteen tons to the acre. The soil was a mixed dark and yellow loam; had been fenced off from the pasture the year before, and planted to squashes and corn fodder, and received but a light dressing of manure.

The present season we manured it with three cords of barnyard manure, the scrapings of the yard after we had finished our planting, and ploughed it in the latter part of May. It was sowed on the second of June, the rows eighteen inches apart, with one pound of orange and one quarter pound of horn carrot seed. I should think one-sixth of the orange seed failed to come up, and on these vacant spots we set our cabbages. The piece was hoed once and weeded twice by hand. The carrots were harvested on the thirteenth and seventeenth of November, by running a plough parallel with the rows, within four to six inches of the carrots, and then we turned them out with the spade."

EXPENSES OF CULTIVATION.

Interest on land,	-	-	-	-	\$5 00
Three cords of manure,	-	-	-	-	18 00
Reading manure, ploughing, harrowing, raking and sowing,	-	-	-	-	6 00
Seed,	-	-	-	-	1 25
Hoing, weeding, and harvesting,	-	-	-	-	26 50

Cherry Hill Farm, Beverly, Nov., 1851.

\$56 75

W. A. Arnold's Statement.

"Cow seven years old. Calved September 13th. From Wednesday morning, September 17th, to Tuesday evening, September 23rd, she gave 111½ quarts strained milk, beer or milk measure. The second week, ending Tuesday evening, September 30, she gave 113 quarts strained milk of the same measure; the third week, ending Tuesday evening, October 7, she gave 108½ quarts strained milk, of same measure. As we sell a portion of the milk, we adopted the following method to ascertain how much butter she would make in a week. We set invariably two quarts of milk in each pan, and kept an account of the number of pans that were skimmed. The first week took the cream from twelve pans, or twenty-four quarts of milk, which made three pounds and seven ounces butter, which is at the rate of fifteen pounds, and fifteen and one-half ounces, from one hundred eleven and one-half quarts, or one week's milk. The second week, took cream from thirteen pans, or twenty-six quarts of milk, which made three pounds and twelve ounces butter, at the rate of sixteen pounds and four ounces for one hundred and thirteen quarts, or one week's milk. Third week, took cream from sixteen pans, or thirty-two quarts of milk, and made four pounds and fifteen ounces butter, which, from one hundred and

eight and one-fourth quarts, or one week's milk, would make sixteen pounds and eleven and one-fourth ounces.

Feed.—Pasturing, two quarts meal, and two pumpkins, per day."

6. *Recommendations selected from Professor Johnston's Report on the Agriculture of New Brunswick.*

"After what has been said in the preceding chapters on the subject of individual practice, it will be unnecessary for me now to touch upon many things which would otherwise have naturally found a place in the present chapter.

By an improvement in practical agriculture, I understand a change in practice, which will enable the farmer to raise larger and more valuable crops from the same extent of land as before, or to produce equal crops at a cheaper rate, without permanent injury to the land. To the practical man, therefore, I wish to recommend nothing which, if rightly performed, will not, in my opinion, be the means of putting more money in his pocket.

What I have said in my suggestions to Agricultural Societies, in regard to draining; deep and subsoil ploughing; green manuring; the use of bones; the saving of waste materials for the manufacture of manure; the covering of manure from the action of the rains and snows in the fold yard, and from the washing of the rains when laid upon the field; of the use of lime; of an earlier cutting of the grain crops; of improving the breeds of stock; of a better housing of the cattle; of the growth and use of green crops, linseed, and prepared food during the winter months: of more diligent and more extended fall ploughing; of the value of agricultural journals and books; all this is intended as special advice also to the individual farmer. Each man can exercise a far more direct and beneficial influence; beneficial to himself and to the Province; over his own practice, than Societies, however zealous they may be, can be expected to do over that of the district in which they are placed. The improving farmer, indeed, does good in two ways. He not only puts more money immediately into his own pocket; but by the influence of his prudent and successful example, he induces others around him to follow in his steps, and to put more money in theirs also. Thus the agricultural improver, the judicious, not the hasty and imprudent one, is a most valuable member of society, and it is for the best interests of every country to support, encourage, and honour him.

There are only a very few additional topics on which I think it necessary to address a few observations to the practical farmers of New Brunswick.

1st. I would recommend the abandonment of the system of cropping with grain, or cutting for hay, till the land is exhausted—a system

hitherto so much followed in the Province. If, while the stumps are still in the ground, the land cannot be ploughed, and must be left in pasture, the manure made by means of the hay and other produce of the farm, should be collected, husbanded, and applied as a top dressing in spring to the early grass. But when the stumps are already up, and grain and root crops have been raised upon the land, the barbarous custom of cutting for hay, year after year, without manure, ought to be for ever abandoned. Such land, when in grass, may be pastured, if thought desirable, for three or four years, it may even be allowed to be in permanent pasture, with an occasional top dressing, but not more than one year's hay ought to be cut, as a general rule, without the application of some fertilizing substance to its surface. When land has already been exhausted by such treatment, the use of bones is deserving of a careful trial.

2ndly. The custom of leaving the land to cover itself with poor natural grass, after the grain crop has been taken off, should also be abandoned. It ought always to be laid down with grass seeds, where a naked fallow is not intended. I have, indeed, seen many cases where naked fields have shown the neglect of this most profitable practice of seeding; but it has generally been upon farms held by the poorest and most ignorant portion of the rural population of the Province.

3rdly. The adoption of a system of experimenting, prudently, cautiously, and on such a scale as, if all his experiments should fail, would not seriously affect his pocket, is the next point I would urge upon the practical man. It is a line of activity upon which he cannot too soon enter. There is a broad intervening space between the actual condition of New Brunswick agriculture, and the condition to which it might be brought by the judicious application of existing knowledge. But that knowledge cannot be diffused among, cannot be acquired by, the farmers of the Province all at once. What they do learn, also, they will naturally doubt, until they have seen it actually applied to, and actually causing more profitable crops to grow upon the land. It is, therefore, by a system of trials that general confidence will be obtained, in this or that method of improvement. The distinction between the man who desires to improve, to advance, which is a sort of condition affecting all material things in North America at the present time, and the man who is content to sit still, is, that the first endeavors to acquire information, and having obtained an inkling of new knowledge, perfect or imperfect, shews a disposition to make use of it, to make trials of the methods of advancement in his own walk, which the knowledge suggests. The maker of agricultural experiments, therefore, is the man who is acquiring knowledge, is thinking how he can apply it most usefully to himself, and is testing the opinions and recommendations he may have heard or read, by the practical means which his farm places in his hands. It is a favorable sign of the diffusion of knowledge, and of the awakening of thought and dormant intellect among the agricultural community of a country, when the habit of experimenting prudently and economically, is seen to diffuse itself among them.

The use of lime is recommended by many in the Province of New Brunswick, and as I think, with reason. The advancing man will, therefore, try lime in a small piece of his land, if he doubts its efficacy, and his means are small; he will try it in various ways, applied, at different times, to different crops, and in different soils; and the results will determine him as to whether it would be more profitable to use it on a larger scale.

* * * * *

With bones, likewise, in various forms, small beginnings may be made by way of experiment. And so with all the improved practices. I have directly recommended, or indirectly alluded to, the really good and zealous farmer, the man who loves his art, and wishes to advance it, if only for his own benefit, and on his own farm, will, from time to time, try them, honestly, fairly, and prudently, yet fully, and will thus keep constantly advancing in experience, and in the profitable culture of his land. There is, indeed, now scarcely any field so wide as that of the experimental farmer, none so full of endless novelties, which the active mind may investigate experimentally, and always with a view to profit. Unlike the old stagnant art of farming, of which the principles were not understood, the art of this present time is guided by clear principles; is full of ever new interest; is in a constant state of progression; and affords full employment for highly intellectual and active minds.

4thly. In the preceding chapters I have recommended the growth of flax, to a certain extent, for the purpose of procuring linseed as a food for the stock, and fibre for the winter's employment of the farmer's household.

* * * * *

5thly. To one other topic I advert, because of its great practical importance, though already frequently noticed in this Report. The improvement of the breed of stock is, in one point of view, the basis of the entire agricultural improvement of a district. Good stock necessitates good feeding. Much stock, and good feeding, produces much and rich manure. Ample manuring enriches the soil, and causes it to produce good crops; and these large crops again, whether of corn hay, or roots, afford the materials for abundant feeding, and for fold-yards full of manure.

But in some parts of the Province there is a prejudice against improved breeds of stock. Thus, Mr. Hubbard, of Burton, writes to me: 'The stock of the country will do better on what we farmers call stock hay, and no shelter, than the English breed will on merchantable hay with shelter; and horses the same.' I infer from these words of Mr. Hubbard, however, that he looks for the profit of his farming, not to the stock he can keep, but to the hay he can sell off his farm. If so, he may continue to rear the hardy animals, which, after all, are only old country stock, degenerated under the treatment they have received in the Provinces, and to make a profit by his good hay; but his land,

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like his stock, will degenerate in time, and it will cost his successors both skill and capital to bring it back again to its original productive condition. I am informed that even the periodically flooded lands on the Saint John River, no longer yield the crops of hay they are known formerly to have produced. The profit of good stock consists, not only in the early maturity which they attain, and the larger produce of beef they yield from the same amount of vegetable food, but in their furnishing also the means by which the land can be maintained in good condition, and be compelled to produce abundant crops for an indefinite period of time.

As to the benefits of shelter, there is now no question among the most experienced breeders and fatteners of stock, as well as among theoretical writers, that an animal which is kept warm thrives better on the same quantity of food, in fact can be kept in condition upon less food, than one which is exposed to the inclemency of the weather. In regard to this point there is not one law for New Brunswick and another for the rest of the world. On this point, Mr. Goodfellow, of Miramichi, writes me as follows:—

‘*Fredericton, 29th November, 1849.*
 SIR—Having been requested to give you my opinion on the treatment of Live Stock in this country, during the winter months, I beg to submit the following remarks:—

‘When I first engaged in farming operations, I kept my cattle in a building similar to those used throughout this Province at the present time; but about five years ago I built a new barn on a side hill; I excavated an under story for my cattle; one side, and part of the ends, are under the ordinary level of the ground; the side facing the hollow is where the cattle enter the building, which is of frame work, boarded and shingled. The building above is also boarded and shingled on the roof and sides. There is a yard in front of the under story, of forty-five feet square. A shed is built on the north and west of the yard, to break off the wind, the south side being left open.

‘Since I kept my cattle in this building, they appear much more comfortable (being entirely free from cold) than they were in the former building, while a saving of twenty per cent. is effected in the food. My cattle are always in better condition in the spring than those of my neighbors who keep their stock in the ordinary buildings of the country, and much less subject to the various distempers to which cattle are liable. No inconvenience is experienced from the building becoming too warm in mild weather, as there is sufficient means for ventilation.”

I cannot but recommend practical men to put faith in Mr. Goodfellow, and follow his example.

The Professor concludes with the following summary of ‘Points to which individual farmers are recommended to direct their attention:’—
 1st. Thorough drainage of clay soils, wet slopes and bottoms, and marsh or dyked lands, where the fall is sufficient to admit of a ready outlet, and a sufficient depth of drain.

- 2nd. Better clearing and deeper ploughing the soil.
- 3rd. More care in saving, collecting and applying manures of all kinds, liquid and solid.
- 4th. An abandonment of the system of cutting repeated crops of hay off the same land till it is exhausted.
- 5th. An abandonment also of the custom of taking repeated successive crops of corn off the same land, without alternation with other crops, and without manure.
- 6th. Cutting down grain of all kinds before it is fully ripe, and grass before it runs to seed.
- 7th. Cutting down Indian corn with a knife, as is done in New York, and use of the stalks in feeding milch cows and other stock.
- 8th. Sowing buckwheat or rye to plough in green, and use of bone-dust to renovate exhausted or worn out lands.
- 9th. Ploughing deeper, in all cases, than has hitherto been usual, but especially such land as has ceased to be productive as formerly.
- 10th. Taking advantage of every open day in the fall, to plough and prepare the land for the spring sowing.
- 11th. Selecting good stock of cattle, pigs, and sheep, for keeping through the winter.
- 12th. Providing warm but well ventilated housing for them.
- 13th. Feeding them plentifully, that they may be in good condition when the spring arrives.
- 14th. Growing turnips and linseed, with the view of adding to the quantity and enriching the quality of the food he has at his disposal.
- 15th. Collecting carefully, and preserving under cover, all the manure made by his stock during the winter, that he may have it abundantly and in good condition for his potato and green crops when the time of planting or sowing comes.
- 16th. Manuring annually, by top dressing, his worn out hay lands, when the land is not stumped, and therefore cannot be ploughed up.
- 17th. Collecting carefully all waste bones, breaking them, and applying them to the land; especially the use of bones is to be recommended upon land which has been worn out by over-cropping with corn.
- 18th. Sowing down always with artificial grasses, when land, after a corn crop, is to be left with a view of its producing hay.
- 19th. To provide shelter, by fences or plantations, for his fields and stock."



Fig. 3. DEVON BULL. (Page 9.)



Fig. 4. DEVON COW.



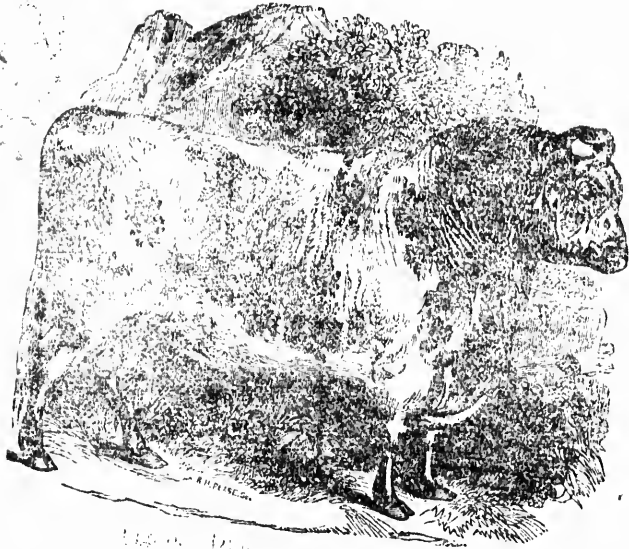


Fig. 5. ZEBU COW.



Fig. 6. DURHAM HEIFER.



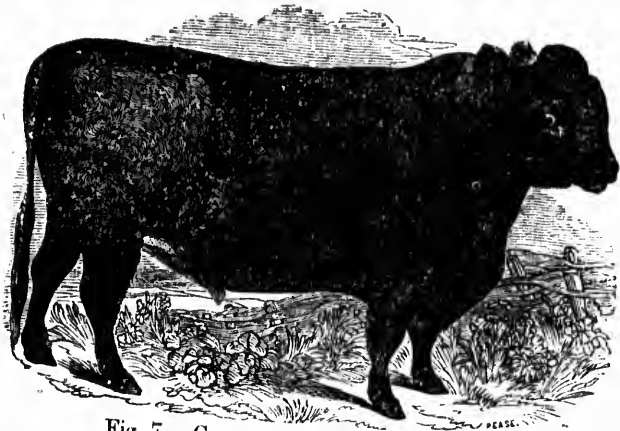


Fig. 7. GALLOWAY BULL. (Page 12.)

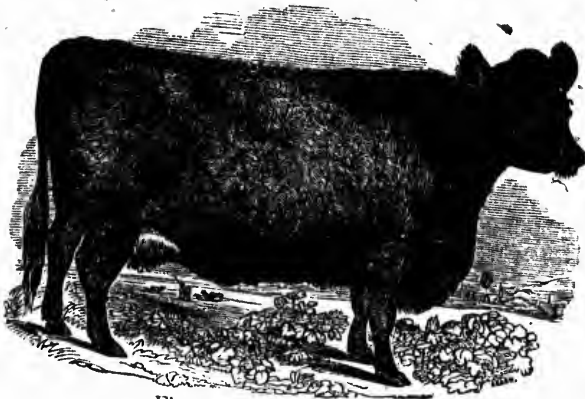


Fig. 8. GALLOWAY COW.



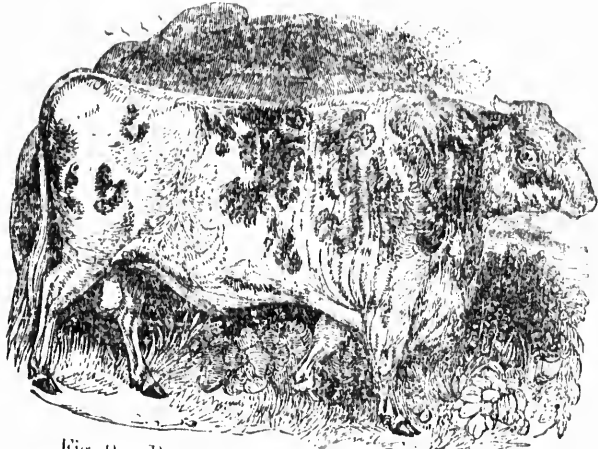


Fig. 9. POLLED SUFFOLK BULL. (Page 12.)

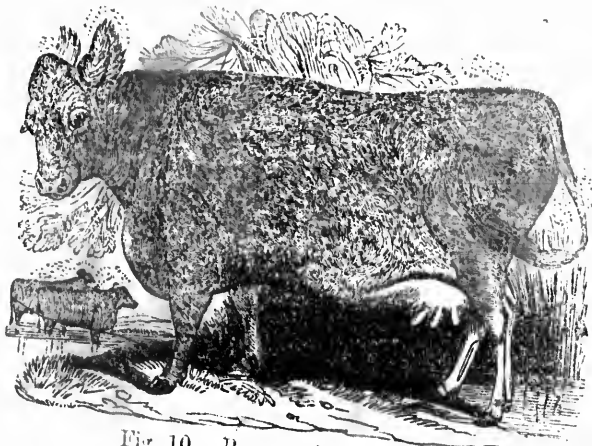


Fig. 10. POLLED SUFFOLK COW.

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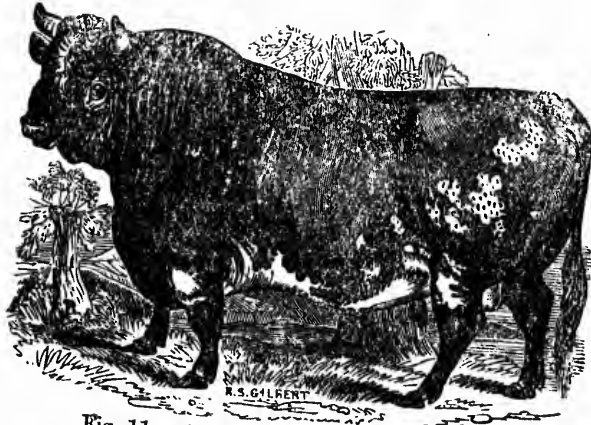


Fig. 11. AYSHIRE BULL. (Page 13.)

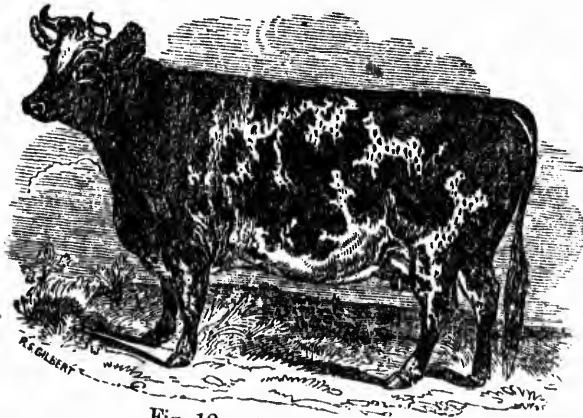


Fig. 12. AYSHIRE COW.

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