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THE

NOVA SCOTIAN

JOURNAL OF AGRICULTURE

Published under direction of the Board of Agriculture of Nova Scotia.

Omnium rerum, ex quibus aliquid adquiritur, nihil est agriculturâ melius, nihil uberius, nihil homine libero dignius.—Cicero: de Officiis, lib. I, cap. 42.

VOL. IV. **HALIFAX, N. S., DECEMBER, 1885.** **No. 64.**

ANNUAL ATTESTED RETURNS for 1885 have been received at the Office for Agriculture, from the following Agricultural Societies:

Co. Annapolis:
Clements Agricultural Society.
Nictaux Agricultural Society.
Paradise Agricultural Society.
Laurie Agricultural Society.
Clarence Agricultural Society.
Annapolis Agricultural Society.
Eastern Annapolis Agricultural Society.

Co. Antigonish:
North Grant Agricultural Society.
St. Andrew's Agricultural Society.
Antigonish Agricultural Society.
Bayfield Agricultural Society.

Co. Cape Breton:
North Sydney Agricultural Society.
Sydney Mines & Little Bras d'Or Agl Soc.
Boulardarie Agricultural Society.
East Bay Agricultural Society.

Co. Colchester:
Bass River Agricultural Society.
Tatamagouche Agricultural Society.
Londonderry Agricultural Society.
Balmoral Agricultural Society.
Earltown Agricultural Society.
Brookfield Agricultural Society.
Shubenacadie Agricultural Society.
Lower Stewiacke Agricultural Society.
Waugh's River Agricultural Society.

Co. Cumberland:
Wentworth Agricultural Society.
Maccan & Nappan Agricultural Society.
Wallace Agricultural Society.
Middleboro Agricultural Society.
Polling District No. 3 Agricultural Soc'y.
Amherst Agricultural Society.
Minudie and Barronsfield Agl Society.
Malagash Agricultural Society.

Co. Digby:
Hillsbury Agricultural Society.
Digby Central Agricultural Society.
Weymouth Agricultural Society.

Co. Guysboro:
New Town Agricultural Society.
Sherbrooke Agricultural Society.
Guysboro Agricultural Society.
Milford Haven Agricultural Society.

Co. Halifax:
Halifax County Agricultural Society.
Upper Musquodoboit Agricultural Soc'y.
Lower Musquodoboit Agricultural Soc'y
Dartmouth Agricultural Society.

Co. Hants:
Enfield Agricultural Society.
Union Agricultural Society.
Newport Agricultural Society.
Progress Agricultural Society.
Fenwick Agricultural Society.
Falmouth Agricultural Society.

Co. Inverness:
Whycocomagh Agricultural Society.
Le Moine Agricultural Society.
Strathlorne Agricultural Society.
Strait of Canso Agricultural Society.
River Dennis Agricultural Society.

Co. Kings:
Tremont Agricultural Society.
West Cornwallis Agricultural Society.
Central Agricultural Society.
Cornwallis Central Agricultural Society.
Kings County Agricultural Society.
Aylesford Agricultural Society.
Union Agricultural Society.

Co. Lunenburg:
Lunenburg Agricultural Society.
Bridgewater Agricultural Society.
Chester Agricultural Society.
Mahone Bay Agricultural Society.
Centreville Agricultural Society.

Co. Pictou:
Pictou Agricultural Society.
Millbrook Agricultural Society.
Pine Tree Agricultural Society.
Alma Agricultural Society.
New Glasgow Agricultural Society.
River John Agricultural Society.

Co. Queens:
Liverpool Agricultural Society.
Kempt Agricultural Society.
North Queens Agricultural Society.
Mutual Benefit Agricultural Society.

Co. Shelburne:
Shelburne Agricultural Society.
Granite Agricultural Society.
Sable River Agricultural Society.
Barrington West Passage Agricult'l Soc.

Co. Victoria:
Baddeck Valley Agricultural Society.
St. Ann's Agricultural Society.
Middle River Agricultural Society.

Co. Yarmouth:
Yarmouth Agricultural Society.

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Bayfield Agricultural Society.

Co. Cape Breton:
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Sydney Mines & Little Bras d'Or Agl Soc.
East Bay Agricultural Society.

Co. Colchester:
Tatamagouche Agricultural Society.
Londonderry Agricultural Society.
Balmoral Agricultural Society.
Earltown Agricultural Society.

Co. Colchester—continued:
Brookfield Agricultural Society.
Shubenacadie Agricultural Society.
Lower Stewiacke Agricultural Society.
Waugh's River Agricultural Society.

Co. Cumberland:
Maccan & Nappan Agricultural Society.
Wallace Agricultural Society.
Middleboro Agricultural Society.
Polling District No. 3 Agricultural Soc'y
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Digby Central Agricultural Society.
Weymouth Agricultural Society.

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Sherbrooke Agricultural Society.
Guysboro Agricultural Society.
Milford Haven Agricultural Society.

Co. Halifax:
Halifax County Agricultural Society.
Upper Musquodoboit Agricultural Soc'y.
Lower Musquodoboit Agricultural Soc'y.
Dartmouth Agricultural Society.

Co. Hants:
Enfield Agricultural Society.
Union Agricultural Society.
Newport Agricultural Society.
Progress Agricultural Society.
Fenwick Agricultural Society.
Falmouth Agricultural Society.
Windsor Agricultural Society.

Co. Inverness:
Whycocomagh Agricultural Society.
Le Moine Agricultural Society.
Strathlorne Agricultural Society.
Strait of Canso Agricultural Society.
River Dennis Agricultural Society.

Co. Kings:
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Central Agricultural Society.
Kings County Agricultural Society.
Aylesford Agricultural Society.
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Chester Agricultural Society.
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Centreville Agricultural Society.

Co. Pictou:
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Millbrook Agricultural Society.
Pine Tree Agricultural Society.
Alma Agricultural Society.
New Glasgow Agricultural Society.
River John Agricultural Society.

Co. Queens:
Liverpool Agricultural Society.
Kempt Agricultural Society.
North Queens Agricultural Society.
Mutual Benefit Agricultural Society.

Co. Richmond:
Lennox Agricultural Society.

Co. Shelburne:
Sable River Agricultural Society.
Barrington West Passage Agricult'l Soc.

Co. Victoria:
Baddeck Valley Agricultural Society.
St. Ann's Agricultural Society.
Middle River Agricultural Society.
Baddeck Agricultural Society.

Co. Yarmouth:
Yarmouth Agricultural Society.

We are indebted to A. K. MacKinlay, Esq., now in England, for a copy of the Catalogue of the Smithfield Cattle Club Show, sent through Mr. Jack. It is the 88th annual show of the Club. There was a good display of roots, grain, &c., besides the cattle and sheep; also a stand of grasses for agricultural purposes. Collections were sent by members of the Royal Family. J. Carter & Co. exhibited 200 glass jars of Ensilage from various people throughout England. Complaint is made of some of the potatoes being "cracked." Potato culture with us does not run so high as to crack the tubers. Among the exhibits were "organic manures," chemical manures, grass, grain, and leguminous seeds, and hay from Hampshire, Cow grass (a large variety of Red Clover) which yielded 3 tons to the acre. 248 boxes of ensilage were shown from the Ensilage Society. Hooper of Covent Garden showed splendid Schoolmaster and White Elephant potatoes. A sample of ensilage cured in 1884 was shown from Luton. The Canadian Pacific Railway made an exhibit, said to be "all natural, without the aid of manures," the produce of Manitoba and the Canadian North West. It consisted of "Gourds and Squashes of enormous size, Onions, Beauty of Hebron potatoes," "the latter grown to about three times its usual size. * * * In a glass case was a sample of the soil, showing its texture for several feet in depth."

STOMATITIS.

By Wm. Jakeman, V. S., Provincial Veterinary Surgeon.

Under the general term Stomatitis have been gathered several, and somewhat differing, forms of inflammatory action invading the mouth. According as the lesions attending this marked action have been viewed, so have separate designations been given to the processes. In the horse, the chief, if not the whole, of the different manifestations of the inflammatory process may conveniently be viewed as (1) Simple or Catarrhal, (2) Vesicular, (3) Pustular.

Cause.—The causes which operate in the induction of the several forms of Stomatitis are in part predisposing,—as age, being more frequent in the young than the adult; defective sanitary conditions; and improper dietary,—being more liable to be developed where depressing and vitiating influences co operate with imperfect nutrition; direct or local irritation. And *Contagion*, animate or otherwise, may develope it.

Simple or Catarrhal Stomatitis.—This form is chiefly observed in young foals with their dams.

Vesicular Stomatitis.—This may be seen both in young and adult animals.

Contagious, Pustular Stomatitis.—This form I wish particularly to speak of here, as it is quite prevalent at present amongst the horses in several parts of our Province, and is in many cases conveyed by contact to the attendants.

Symptoms.—Generally the first noticed is a ropy flow of Saliva from the mouth, and, on closer examination, minute round vesicles, situated on the inner sides of the cheeks, around the angles of the mouth, under and about the tongue, shortly distinct pustules form, and, rupturing, leave well marked, pit-like ulcers; these some times coalesce, forming large, angry-looking excoriations, and foetid smell is given out; in this condition the poor animal can eat but little.

Treatment.—The animals ought to be removed from foul and unwholesome stables, allowed sufficiency of exercise, with fresh air; boiled linseed and oats, scalded bran, and if able to eat, carrots or potatoes.

Local Applications.—These may be linseed tea with a weak solution of Bicarbonate or Chlorate of Patash, twice or thrice daily; when there is much foetor, or the sores or ulcerous spots do not appear to heal well, they require surgical interference, and owners had better secure professional aid.

HOW TO MAKE GOOD BUTTER.

BY PROFESSOR SHELDON.

The Raising of Cream.

The current generation of men has invented more ways of raising cream than all the preceding ones, and in this we see the most striking evidence to be found of the extraordinary activity which pervades the domain of the dairy. These inventions include, indeed, one of the most curious and wonderful machines which mechanical science has ever produced—a machine, by the way, which is quite as effective as it is wonderful, and which has already become indispensable in many large establishments. I refer now to what is known as the centrifugal cream-separator. Of the various adaptations of the Swartz system, in which the employment of ice is the salient feature, it is unnecessary to describe or even mention, because few if any of them are adapted to this country and climate, and because in all large establishments the "separator" has already superseded them, while for small ones the ancient open-pan system is, when properly employed, good enough for all practical purposes, simpler than most others, and thoroughly reliable.

The centrifugal separator employs, as

its name suggests, a natural law of force, and in a most strikingly effective manner. There are already several of these separators, wholly disparate in character and appearance, but employing the same principle—that of centrifugal force—in the separation of the cream from the milk. And the application of this natural law is, in this case, uncommonly simple and effective, working perfectly, quickly, and continuously. A hollow vessel, made of great strength—resembling an exaggerated orange in form, in one of the machines—revolves at a great speed; the speed, however, varies from 1,500 to 6,000 revolutions per minute, in the different machines. The milk is made to run into the vessel in a stream, like the stem of a clay pipe, and instantly responds to the motion. The effect of the motion is to separate the cream from the milk—the lighter from the heavier portion—whereupon the latter gravitates to the outer, and the former to the inner, circumference of the rotating vessel, tubes being arranged to conduct them away as fast as they separate. The amazing simplicity of these machines, and their efficient action, has made them, in the short space of six to seven years, to assume the position of a thoroughly practical instrument, and their permanence is distinctly assured. I saw the germ of these machines—the idea from which they have been evolved—exhibited at the International Dairy Show in Hamburg in 1877, and since that time they have been simplified and improved to a degree which seems to exclude the desirability of much further alteration. The advantages fairly and justly claimed for the centrifugal separator are these: that perfectly fresh cream and skim-milk are produced, that less cream is left in the skim-milk than under any other system, that fewer vessels and utensils are needed in the dairy, that the risk of having sour milk and cream is entirely removed, even in the hottest weather, and so on. The advantage of having fresh cream and fresh skim-milk, where both of these are sold, is of course abundantly obvious; and, even in the domain of butter-making, it is advisable to have the cream severed from the milk before any acidity has developed, even though the cream may afterwards be kept until it has soured more or less. On this point I shall have more to say later on.

The centrifugal machine, however, is too costly a thing, and too elaborate in its accessories, to be suitable to small dairies. Unless water power is available, an engine is required to drive it, for horse power is too unsteady to be relied on, so that the cost of the machine itself is not all, or nearly all, that has to be considered. I consider, notwithstanding, that a butter making farmer who milks from thirty to fifty cows may employ one with profit and advantage, particularly when he has the chance of selling his skim-milk. At the same time it must be allowed that on the ancient open-pan system of raising cream the best of butter is made, wherever the system is intelligently and carefully carried out. The leading and fundamental requirement in this system is a properly constructed dairy, well drained and ventilated, and whose temperature can be so regulated as not to vary very much. Providing the room is cool enough in summer, the regulation of the temperature in winter is a simple matter enough. A room with double walls and an air space, with a ceiling at the square, and an "air-cushion" between it and the roof, and lastly, a felt roof a foot or two above the hard one, and an air space between them, the air circulating freely, will, I have reason to believe, secure inside the room a temperature which will seldom rise above 65 degrees in any weather to which we are subject in the British Islands; and this immunity from excessive heat is all the more probable if the dairy has a northern aspect, and is shaded by a large tree or two from the sun's rays. A room so constructed will also be dry, in which event the gases of the milk will pass off into the air, and there is no atmospheric moisture to speak of, no vapors, sweet or otherwise, to condense on the surface of the milk as it cools.

Milk does not become unmanageable if the temperature of the room does not rise above 65 degrees in the middle of the day. It must be borne in mind always that this question of temperature, closely followed by those of cleanliness, watchfulness, and industry, is of very considerable importance in a dairy. No dairy equipment is complete without a thermometer. The colder the room, especially in summer, the faster the cream will rise, and the more thoroughly. This is the result of natural laws. Water, of which milk is chiefly composed, shrinks sooner than fat does under the influence of cold, as also it expands quicker under the influence of heat. This is because it is a better conductor of both cold and heat than fat is. And the result of milk being placed in an atmosphere much colder than it is itself at the time, or in much colder water, is seen in the comparatively rapid ascent of the cream. This is simply because fat, being a slower conductor of cold than water is, retains its buoyancy all the longer, and so rises to the surface quicker in a falling temperature of the milk than it does in a stationary one. And it rises all the quicker, within limits, the more rapidly the milk is cooled. This, indeed, is well observed in the Swartz and Cooley systems of milk-setting—the former operating in ice water and the latter in a current of cold water, and both of them in troughs or boxes containing the water in which the cans of milk are placed.

Some persons attach importance to the heating of milk to 130 degrees or so, soon after it is taken from the cow. Intelligently pursued, this practice is a sound one. In the first place, heating will expel the animal odor—the "cowey" smell—from the milk; it will, for the time being, checkmate the action of fermentive germs that milk may naturally contain, or that it may have absorbed from the air; and it will tend to the dissipation of the peculiar flavor which some kinds of food—turnips, for instance—impart to milk that is produced by their aid. But it must be remembered that milk at a high temperature is all the more liable to go sour from the formation of lactic acid, so that, especially in warm weather, and unless it can be placed in a cold room, it should at once be cooled down to 70 degrees or so, after which the cooling may be allowed to proceed more leisurely during the time the cream is rising. During the rapid cooling from the high temperature the milk should be stirred, or an albuminous skin will form on the surface, and this is objectionable. Milk heated and cooled in this way will remain sweet longer than with cooling from its natural temperature only, and the cream will rise the quicker. The heating is said to enlarge the cream globules by coalesence and the larger the globules the sooner they rise—a fact which has been microscopically ascertained in milk whose globules vary in size, which, indeed, is the case in all qualities of milk.

A cool dairy, then, is specially valuable in summer time, hastening the rising of the cream and keeping the milk from souring. In order to produce the finest-flavored butter, pure and delicate in aroma, it is essential, I consider, to prevent all approach of sourness, and to churn sweet cream. Acidity in milk is incipient decomposition, and it is the more delicate flavoring oils which suffer first from among the fats of which butter is composed. Butter made from perfectly fresh cream is of course pure in flavor, but there is not a full flavor in it; and if a full-flavored butter is desired, which is generally the case, it is necessary to let the cream "ripen" by keeping it some days, but keeping it sweet all the time. Some persons prefer the cream to be slightly sour when it is churned, and the souring will make a tough and keeping butter, somewhat less attractive in flavor, and which is more easily churned as a rule. But, at the same time, a more admirable butter is made from ripened cream that is still free from perceptible acidity.—*From the Canadian Breeder.*

MEETING OF SHORT HORN BREEDERS.

A meeting called by a few Short Horn breeders in King's, Cumberland and Pictou Counties, was held lately in the Province Building, Halifax, the object being to consider the propriety of forming a company to organize a select register on the lines of the British American one. Mr. Baker of Athol occupied the chair, and Mr. O. Chase acted as secretary. The opinions expressed being diverse, and several of the leading Short Horn breeders of the Province not being present, it was arranged to defer final action to a future meeting, to be held during the sitting of the legislature. Hon. Mr. Ferguson, of Prince Edward Island, was present and detailed very fully the action that had been taken in Prince Edward Island to bring the registry—which was kept by a private gentleman—up to the Canadian standard. Mr. Gregory was opposed to any change. Mr. McKay was doubtful whether our breeders should not seek registry in the British American register instead of organizing a new one. Mr. Jacques thought there were reasons why a Nova Scotia register might be better, as a low standard kept purchasers from the other provinces coming here to buy. The chairman thought the matter was one of great importance to Short Horn men, as, without a high standard register such as exists in Ontario, the commercial value of our thoroughbred cattle would be kept down. Prices in Nova Scotia were now about a third of what the same animals would bring in Ontario if registered there. Mr. Chase advocated a high standard Nova Scotia register, which would not necessarily interfere in any way with the present register kept by the Government. The new register would be under the charge of a company of breeders who could make their own regulations. Professor Lawson suggested the propriety of considering whether, by the concentrated action of the Maritime Provinces, the very desirable object now under consideration, of uniting the British American and Canadian registers into one, might not be promoted and probably accomplished, and that a standard might be adopted for the Canadian Herd Books uniform with that of the American and English Herd Books, so that there should exist for the whole world three Short Horn Registers, the pedigrees of which would all be uniform and pass current in all countries as of equal value.

The following is from the London *Morning Post* of 24th November:—

Last week two very important displays of colonial produce were made in London. The first was a highly interesting show of apples grown in Nova Scotia, which was held at the Crystal Palace. To the growing importation of fruit from this colony we have in these columns frequently called attention, but we were hardly prepared for the marvellous exhibition which has just been held. This was projected by Messrs. Northard and Lowe, and consisted of three classes. In Class 1, the competition consisted of collections of Nova Scotian or Canadian apples of from 70 to 90 varieties. The first three prizes went to Nova Scotia, the growers being Messrs. T. E. Smith, E. M'Latchy, and R. W. Starr—all the fruit shown by these being very fine—the Gravensteins, King of Tompkins, Blenheim Orange, Ribston Pippin, Fallawater, King of Pippins, and the various russets being of great size and high color. The fourth prize went to Canada (to Mr. Nicoll), but the apples were not so good as the Nova Scotians, and were poor when placed beside them. Class 2 was for 24 dishes, and here again the Nova Scotian apples were incomparably the superior ones, taking all the prizes. The entries here were large, and the show interesting. Class 3 was for the best packing, and here again the prizes were won by Nova Scotian growers. The show was noteworthy as showing what a small place like this has been able to do in a very short time in this matter. The authorities of the province saw some 10 years ago that there was an opening for the growth of really first-class apples, *well packed*, and sent to England and America. The third class in this show ought to have been seen by English growers, for it was a capital example of how to send to market. Only so long ago as 1881 but few apples were sent to this country, now Messrs. Northard and Lowe receive something like 10,000 barrels a year. Both in New York and London a market has been created, and for these splendid and well-packed fruit the highest prices are obtainable. There was a great lesson to the English farmer and promologist in this show.

The other exhibit was also Canadian, and was on view for a few days at the offices of the Canadian Pacific Railway in Cannon-street. It consisted of a collection of agricultural produce and fruits, grown in various parts of the Canadian North-west, which have been brought back to this country by Mr. Alexander Begg. It will be on view at the Birmingham and Smithfield Shows, and will certainly cause some of our agriculturists to stare with astonishment. There is a collection of 42 varieties of potatoes grown at Stonewall, Manitoba. Here such varieties as Beauty of Hebron, White Elephant, Early Rose, &c., are perfect in shape and size, while there are others containing single potatoes weighing from 2½lb. to 3lb. each. These are the largest potatoes the writer has ever seen. There was a splendid lot of Swede turnips, no giants, but all firm and useful; onions of perfect shape; radishes weighing 1lb. each; tomatoes grown in the open over 300 miles west of Winnipeg; peppers, plums, apricots, parsnips, and beet, all of large size and perfect. But it is the summer squashes, one of which is 2½ft. in length and over 2ft. in circumference, the citron melons, water melons, vegetable marrows, and pumpkins that will form the curious features of the exhibit. All are of large size and well ripened. The produce and fruits have been brought home as an answer to the recent statements as to the climate of Manitoba, and each lot is marked with the name of the grower and the parish in which grown. All come from places from 300 to 640 miles west of Winnipeg

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At Keeling and Hunt's auction of Nova Scotian, Canadian and American apples in London on 8th December, one lot of Nova Scotian Ribston Pippins brought the top price of the sale, viz. 26s. 6d., equal to about $6.50. Other prices realized for Nova Scotian fruit were as follows:

Ribstons, 15s. 6d. 11s. 6d. 16s.
Greenings, 10s. 6d., 10s.
Russets, 10s.
Baldwins, 10s., 15s.
King Tompkins, 12s., 7s., 15., 9s. 6d., 13s., 15s.
C. Permain, 8s.
Mammoth Russet, 10s.
Talman Sweet, 10s. 6d., 9s.
Seek-no-further, 11s. 6d.
Greening, 11s., 10s. 9d.
M. Russet, 8s. 6d.
Vandevere, 10s.
Spitz, 12., 10s.
Blenheim Pippin, 15s.
Newton Pippin, 10s.

The highest prices obtained for the Canadian and American fruit were:

Newton Pippins 24s. 6d. Russets, 19s. 6d. Golden Russet, 17s. Twenty ounce, 18s. 6d. Many lots ran down to 15s. 10s. and some even under the 10s.

In the little German village of Offenburg, on the borders of the Black Forest, there is a huge monument. On the pedestal stands the figure of a man in dress of the Elizabethan courtier. On the projecting base there is a splendid carving in stone of a large loose pile of potatoes. It is a monument to Sir Francis Drake, who, in the carved figure, holds a potato plant in his hand. On the four sides of the pedestal are inscriptions expressing the gratitude of a great people for the blessing that the Creator had seen pleased to bestow upon them in time of famine.

THE following judicious observations and rules for the HOUSING OF CATTLE are quoted by the *Farmer's Advocate* from the *Milch Zeitung*:—

It is a great mistake to believe that cattle can live without injury to their health, in narrow uncleanly stalls, where there is defective ventilation. The breathing of impure air is very prejudicial to their health. The unhealthy condition of the stalls is unquestionably the cause of many diseases, and frequently brings on abortion. It cannot be too emphatically insisted upon that farmers should not shut up their animals in these narrow prisons, where there is little light or air, where dung and filthy water and other unbelongings collect, and where cleanly people cannot enter without disgust. Such cattle cannot thrive, and more especially do young, growing cattle suffer, and, with a regard to cows, both the quantity and the quality of the milk are seriously affected.

Every stall requires the following conditions: that it offer sufficient room for the comfort of its occupant; that it be dry, no dampness being permitted to penetrate the floor or walls; that the temperature be easily regulated; that there be sufficient light; that the ventilation be sufficient to draw away the foul air with becoming haste; that it be kept thoroughly clean without wasteful labor; that the passages be spacious enough for purposes intended; that the mangers be so arranged as to produce a minimum waste of feed; that the arrangements be such as will promote a hasty retreat of the cattle in case of fire.

Having dwelt on the importance of saving the manure—"the soul of Agriculture," the writer continues:—

1.—All the food and water utensils should be kept scrupulously clean, and, when necessary, washed out with lime water or lye. The waste food should be completely taken out before a fresh supply is placed in the manger. Such animals as hens, which render the food uncleanly, should not be tolerated in the stables.

2.—Don't be too saving of the litter; it should be frequently renewed; no wet or dungy portion of it should remain in the stall, and it should be frequently renewed; frequently shaken up and evened about. This is specially necessary to the thriving of the stock, and to the production of clean and healthy dairy products.

3.—The animals, especially the younger ones, should be kept clean by rubbing them at least once a day with a wisp of straw, and grooming them thoroughly with comb and brush at least once a week, being careful not to use a sharp-toothed comb. Never forget to keep the cows' udders clean, rubbing them often, but not with ice-cold water, drying thoroughly with a coarse woollen cloth. Cattle breathe, as it were, through the skin, and the importance of maintaining atmospheric communication between the air and the blood through the pores is so great that the animal may become excruciatingly tormented if this hide breathing be prevented by artificial plugging up of the pores. The exterior dirt must therefore not only be removed by grooming, but also the finer dust and loosened scales, which, owing to the sweat cause a plugging up of the pores and an exclusion of the air. This condition throws too much work on the lungs; the more active the skin is kept, the less work will the lungs have to perform. Neglect of this important consideration is a fruitful source of disease; and the animal products, as articles for human food, greatly suffer in point of healthfulness.

4.—The feeding, drinking, milking and outing of the cattle should be punctually attended to; otherwise they become restless, which have an injurious effect on their thrift as well as on their products.

5.—The cattle must have sufficient time between meals to allow their food to digest, so that the more difficult the food is to digest, the longer should be the time between meals; or in other words, keep the most digestible food for the evening meals, so that it will be fully digested before morning.

6.—Feed according to the natural appetites and digestive capacities of each class of animals; and arrange them so that the greatest eaters come together in one stable, thereby causing less labor in the distribution of the coarser and more indigestible foods.

7.—Keep away as many strangers as possible, and never permit dogs or hogs to enter the stables. Anything which disturbs the comfort and peace of the animals has an injurious effect upon their thrift.

8.—Plenty of exercise should be given to each animal daily, according to its ability to stand it. This advice should be strictly followed in reference to growing animals.

9.—Gentle conduct cannot be too strongly recommended. Rough handling not only makes the animals mistrustful and excitable, but also produces profitless results from the food given. Rough, soulless, and irritable cattlemen should never be tolerated about the premises.

THE question, What Chemical Elements are essential to the Growth of Plants? is one of no less interest from a strictly scientific point of view, than it is important in its economic relations. We have not yet reached the full answer, chiefly perhaps because the efforts to do so have been left too much to the Agricultural Experimenter, instead of being made in a direct scientific line, which, in such matters, is often the shortest way to truth.

The attention of the British Association was called to this subject, at the recent Aberdeen meeting by Mr. Thomas Jamieson, who appears to have made a series of very careful experiments. These do not entirely justify his conclusions, it is true; but we know that the readers of the JOURNAL OF AGRICULTURE will be interested in hearing what the results were, and some of the lessons they teach.

The food materials essential to plants consist of eleven elementary substances, viz.:—

1. *Carbon*, *Hydrogen* and *Oxygen*. These are freely supplied to the plant by the Carbonic Acid of the air and Water, which are both abundant wherever plants are grown. The cultivator does not need to specially supply them.

2. *Nitrogen*. The supply of this element, in nature, although sufficient for the deliberate growth of wild plants, is inadequate to the exhuberant and rapid development necessary for artificial production.

3. *Phosphorus*, *Potassium*, *Calcium*, *Magnesium*, *Sulphur*, *Chlorine* and *Iron*. These are distinguished from the two preceding groups by *(a)* existing in plants in inconstant and often insignificant proportions, and *(b)* by not entering into organic (plant) compounds in the definite chemical ratio that can be expressed in a chemical formula.

The special object of the experiments undertaken by Mr. Jamieson was to ascertain whether all or any of the seven elements in the third group were really necessary as plant food.

Phosphorus is its most important member. Twelve plots of uniform sand, were supplied with a uniform mixture, containing all the elements understood to be necessary for plant growth, *except phosphorus*. Phosphorus was then applied to ten of the twelve plots and withheld from the remaining two.

Results: In the two plots from which phosphorus had been withheld, the plants absolutely refused to grow beyond the first few leaflets, and made only abortive attempts to form a bulb. The averages of experiments with various sources of Phosphorus yielded the following results, each plot being the thousandth part of an acre:—

	Weight of Turnips (water extracted.
Superphosphate	87½ ounces.
Bone Ash	86 "
Steamed Bone Flour	85½ "
Coprolite	83 "
Steamed Bone Flour and Coprolite	80 "
No Phosphate	3½ "

The experiments were conducted for four years on the same plots, with a duplicate series for checking, and the results were substantially alike throughout. The details given by Mr. Jamieson are too elaborate to be repeated; we give carefully the pith of his results. It is abundantly evident that Phosphorus is essential to the growth of the Turnip plant.

POTASSIUM.

Similar results were obtained when Potassium was withheld, but the decrease in the crop was not well marked in case of Turnips; it was only in case of Peas that a decided decrease took place. The results varied considerably with the forms in which the potash was applied.

One thousandth part of an acre, with Potash Nitrate, yielded 47 ozs. Peas.

" Phosphate .....33 "
" Sulphate.....33 "
" Carbonate.....30 "
" Chloride..... 1 "
No potash.....2 "
No manure..... 3 "

Turnips.

Potash Nitrate yielded.73 ozs. Turnips.
" Sulphate.....41 "
" Phosphate.....40½ "
" Carbonate.....36½ "
No potash.....38½ "
No manure..... 0 "

Subsequent experiments showed that Carbonate of Soda could not take the place of Potash. This is a remarkable result, as we know from Dr. Voeleker's analyses of seaside plants grown on the shore and inland, that the inland specimens had their soda partly replaced with potash.

Mr. Jamieson's experiments show conclusively that Potash is an essential element to the Pea and Turnip plants.

CALCIUM.

Calcium Oxide is ordinary lime. In experiments with pure chemical salts as manures, the following results were obtained. The crops were weighed without extracting water:—

Nothing withheld..... ..42 lbs. Turnips.
Lime withheld.....55 "
Everything withheld.....$\frac{1}{10}$ "

Mr. Jamieson concludes from these and other experiments that Calcium is not essential to the plant. If that be the case, the addition of Lime to the soil can only be beneficial in bringing about changes in compounds already existing in it.

MAGNESIUM.

Nothing withheld.....42 lbs. Turnips.
Magnesia withheld .....49 "
Everything withheld.....$\frac{1}{10}$ "

Also that the withholding of Magnesia did not lessen the crop; consequently Magnesia is not essential.

SULPHUR.

Nothing withheld.....42 lbs. Turnips.
Sulphur withheld, 1 year.51 "
Sulphur " 2 years (on same plot).....39 "
Do. do. ....37 "

Mr. Jamieson concludes, from many experiments, of which we have quoted only enough to show actual results, that "the general result seems to foreshadow the exclusion of Sulphur, Magnesium and Calcium from the list of plant essentials."

As regards Sulphur, the conclusion may be correct in reference to the special crop—Turnips—experimented with; but it is to be borne in mind that Leguminous plants contain notable quantities of Sulphur in organic combination as Legumin; that Lawes and Gilbert have recently shown that Clover is rich in Sulphur, although it escaped previous analysts who did not find it in the ash, as, being uncombined with lime or other bases, it went off in burning; and that the application of Calcium Sulphate is well-known to have a beneficial effect upon Leguminous and certain other families of plants.

Chlorine and Iron are not regarded by Jamieson as essentials. On the contrary, a glance at the experiments given above with Potassium Chloride indicate that Chlorine is injurious to plants. He states that the plants were actually killed by the salt, the symptoms pointing to the action of free chlorine; but there are not satisfactory experiments sufficient to support this theory. The alleged action of Sulphur in promoting fungoid disease is not in accordance with the experience of other experimenters.

We are glad to see that Mr. Jamieson is again at work going over other experiments on the same plan, and we shall look with interest for the results.

CURING CLOVER HAY.

We used to put hay up in cocks; also used to haul in quite green, and use straw and salt to aid in the curing. But gradually, by a sort of natural selection of plans, we have now discarded all this, and seldom cock our hay except to avoid damage from an approaching shower. We cure in the field by sun and air until it is safe to pack as solid as possible in the mow, in which state—approximating the principle of a silo—it will best retain the juiciness and fragrance with which it came from the field. We recognize that seasons, climates, and state of the crop differ so much that no set system can be followed, and only general principles kept in view. These principles, with us, are about as follow:

First, we hold that exposure to the sun and air is, in our climate, the surest and best mode of curing hay, and is also attended with least cost of labor and time. If caught by three or four days, or a week, of dull weather, we would try to have our hay in cock, so as to be less exposed, and to gain some aid by fermentation. But such "spells" seldom come in our hay time, and we try to avoid them by commencing immediately after a storm, and by pushing the work rapidly in fair weather, and slowly or not at all in bad weather.

Second, we believe that there is a certain rapidity in curing clover hay which is best for the product—too slow tending to sourness, and too rapid to waste of the best portions. If the grass is very immature and rank, or the weather not very drying, we cut when it suits, and leave it spread on the ground until it can be readily raked, hastening the process sometimes by shaking or tedding. The dew does not injure hay much when too green for the horse-rake to manage. If the grass is older, or the weather very drying, we sometimes time the cutting to suit the convenience of raking and hauling, but mostly cut when it suits, or if possible, keep one team cutting and raking while another is hauling. The main point is to rake into windrows as soon as the steel-tooth rake can do it properly—in small windrows if drying slow, and larger if drying rapidly. These we do not spread out again, but may turn them once or twice to get in better shape, and expose new surfaces to the sun and air. By regulating these processes to suit the widely different circumstances of the crop and weather, we can generally control the curing as we wish, both in rapidity and extent. Under average circumstances, we can cut all of one day and haul in the next—that cut in the forenoon being raked up in the evening, the other during the next forenoon. But sometimes the whole process can be accomplished in one day, while at other times it may possibly require three or four days.

Third, the extent of curing necessary depends much on the kind of mow in which it is placed, and the quantity of hay to be stored. If the mow is as air-tight as a silo should be, and if a great depth of hay is stored in it, but little curing will be necessary for any except the top loads, which must be dry straw or extra well cured hay. But I think that in our climate more would be lost by the increased labor of hauling and storing green hay than could be gained by the quality of the product. For common mows, the clover requires drying until it approximates the weight, feel and look of hay. Closer instruction can only be gained from experience.

Clover, sowed thin enough, or mixed sufficiently with timothy to avoid coarseness of stem, cut when the heads com-

mence to turn brown, and cured so it will not char on the one hand or turn to dust and bits on the other, makes a cattle food so nearly perfect, that it is scarcely worth while to try to improve it by silo or otherwise. I am a warm friend to the silo, but it is simply because I cannot obtain enough nicely cured clover hay for dairy purposes. Corn fodder is a coarser, poorer article, which can be raised in greater quantity, but cannot be cured and fed conveniently, as clover hay. By the silo we can take it in its best condition, preserve in its most convenient state for mixing with feed, and thus make it nearly equal to clover hay at less cost.—*Robert K. Tomlinson, in Country Gentleman.*

The American beef supply was the subject of an important paper presented by Commissioner Colman, of the Agricultural Bureau, for the consideration of the Cattle Growers' Association at their meeting in Chicago. Mr. Colman showed that in 1850, when the first accurate statistics in regard to cattle-growing were taken, there was a population of 23,191,867 and 11,778,907 head of cattle or 766 cattle to each thousand of inhabitants. In 1860 there were 815 head of cattle to each thousand of population, but in 1880 only 716. The beef-eaters increase in number faster than the source of supply. During the period from 1860 to 1880 there was a prodigious increase in the herds, owing to the development of cattle-growing in the grazing districts of the Western plains. Grazing sections in the far West are now pretty well stocked, from the Rio Grande to the Canadian line, and it is found that when the herds are increased and the grass eaten too close it fails to seed and becomes unproductive, supporting thereafter fewer cattle. The best districts are all taken up, and the cattle on them cannot be materially increased. Cattle-growing west of the Mississippi cannot be increased in the next decade as it has been in the last, and the prospect is that, from this time on, population will grow much faster than the beef supply. In all probability it will not be a great many years before the beef supply will only serve to meet the American consumption, and there will be nothing left for export to Europe. In connection with Mr. Colman's view as to the future of Cattle Grazing in the western plains, we would cite the following recent telegrams from the Toronto *Globe*. It is very well for enterprising young men to go west. But, if there is as good pasturage in Nova Scotia as in the far-off west, we would rather have them stay at home:

Galveston, Texas, Jan. 12.—A despatch from Corpus Christi says the extreme cold weather continues there, with indications of a heavy fall of snow and sleet. The cattle in that vicinity are dying in large numbers. Greenville, in the north of Texas, reports all the streams in that vicinity frozen to a depth of five inches and stock suffering from the lack of water. The Brazos and Concho Rivers are frozen.

Savannah, Ga., Jan. 12.—The weather continues unprecedentedly cold here. Many water pipes are frozen. There is good skating on the flats. Overdue steamers from northern ports report unusually rough weather. Advices from the southern parts of the States report extremely cold weather and great damage to fruit trees and vegetables.

Dodge City, Kansas, Jan. 12.—The heavy snow and bitter north winds of the past ten days have caused most serious apprehensions among cattlemen as to their probable losses. Within a few miles of here five hundred head have drifted to the river, where they perished in attempting to cross, or drifted up to the fences where they remained till frozen to death. A man from a ranche south reports seeing on his way up cattle frozen that were standing on their feet. The water holes are frozen over. The grass is snowed under and the weather is cold, with even a prospect of more snow. The loss of live stock will be very heavy on the Arkansas River.

A beautiful silver vase was presented to Dr. Asa Gray, the veteran American Botanist, on November 18th, his 75th birthday, by 180 American botanists. The ornamentation of the vase consisted of designs from some of the more conspicuous American plants connected with Dr. Gray's name and writings. Some one sent 75 roses, one for each of his years. Mr. Lowell's tribute was the following:—

> Just fate prolong his life, well spent,
> Whose indefatigable hours
> Have been as gaily innocent,
> And fragrant, as his flowers.

Experiments at Chiswick show that *whole* potato sets usually give a much greater produce than cut sets. In corroboration of these experiments we have the result of planting a palmate potato The Scientific Committee of the Royal Horticultural Society of London report that this palmate or composite (fingered) potato, which weighed 15 ounces, yielded, when planted in 1885, 8 lbs. of produce.

Dr. Masters' reports to the Royal Agricultural Society, in regard to points in potato culture as follows:—

1. Earthing up produces a more uniform crop, and of superior quality, even if less in quantity.

2. Bending the vines occasions a diminished yield.

3. A larger aggregate produce is derived from planting whole tubers than is derived from cut sets.

It is alleged that at the recent Birmingham Cattle Show prizes were awarded to samples of potatoes that were artificially colored.

At the recent Annual Convention of the Eastern Dairyman's Association of Ontario, Prof. Barre, of the Guelph Experimental Farm, gave an interesting address on "the dairy cows." He said the farmers of Ontario were too careless as to the sire of their herds. All experts on this subject held they should have a fineness resembling the female cow. Their milk-producing qualities should be the first thing considered. Among these breeds he mentioned the Galways, leaving the Jersey's, Ayrshires, and Holsteins in the field. While the Jerseys were famous for large yields, they were not dairy cows. The Ayrshires had a good record, yet they were not the cows for Ontario. The Holstein were better known as belonging to the Dutch cattle. He said this race are renowned as deep milkers, and would give between 6,000 and 12,000 lbs. of milk. The question was, could the Holstein be adapted to this country? The Shorthorn grade were found to be a very could cow, in fact the preference, he thought, was between the Holstein and Shorthorn grades. The Shorthorns would become the average farmer's cow in Ontario. Farmers should cull the best herd—that was the only way to make dairying cows. Good milch cows had marks which were seldom misleading. They had mild dispositions, and a good, regular appetite. The digestive organs should be healthy, and the skin should be soft and elastic, the size depending upon the breed. The best milch cows are seldom fleshy. The body should be large and broad, and the age between four and five years. As yet, he said, experiments at the Guelph Farm were not conclusive as to which was the dairy cow.

Mr. Bowick writes from Harpenden, England, the following description of the most famous Experimental Farm in the world, that of Sir John Lawes:—

Every State of the Union has sent its sons, at different times in the past half century, to see something of the experiments which have rendered Rothamsted famous throughout the world. It is a pleasant place to come to, and a hospitable one withal. True science welcomes inquirers, and does not lord it over them at arms length. Still a few of your readers have not been on this side the water, and they may like a short pen-and-ink sketch of things here—the more so as Sir John is also an honored contributor to these columns.

Situated half an hour north of London, on the Midland railway—the favorite line for American travelers from Liverpool—the place is easy of access. A little way from the station, the park gates are reached, and the visitor has a beautiful drive of nearly a mile with the rich sward—rarely to be equalled for its velvety character in America—stretching on either side. Rothamsted Hall is an old family mansion, with a predominating Elizabethan character, and

a clock-tower which is a *fac simile* of the one at Hatfield, the favorite residence of "good Queen Bess," some ten miles hence as the crow flies. A few squirrels in the park are busying themselves on the trees this crisp autumn morning, though few in number compared with what one sees in Central Park, New York. The oak predominates, and the English elm also thrives here, sending its roots through the yellow clayey, stony surface to the chalk which lies everywhere beneath. It was not one of the most fertile spots naturally that fell to Sir John's hand by inheritance when quite a youth; but having been in the family for three centuries at least, it has not been allowed to deteriorate in his care.

Born in 1814, he was not over twenty when his mind was directed to those severe forms of study for which a training at Eton and Oxford had given a ground-work to start from. A tough, wiry frame, and an active, lissome step, which up to now despises the aid of horse or carriage when they can be avoided, has built up a constitution that no difficulties can damp, and that has "persistence" marked in every line and feature. The first laboratory was an old barn, and good work was done there. But some forty years ago or more, Sir John fortunateiy associated with himself a youny and rising chemist, who had English and German experiences of the highest character. Dr. Gilbert's name has been as well known as Sir John's, in the time that has since elapsed, but present limits forbid telling what I know about *him* till another time.

Some 500 acres are kept in hand, on the estate, and a great portion of this is very carefully worked, so as to give experimental results on a large scale. But the Rothamsted experiments do not regard this as their special field of action. The experimental work proper, in its rigid and severer forms, extends to some 50 or 60 acres. Part of this is in permanent pasture, part arable, and, I may add, a portion left to the hand of Nature. As every reader is aware, a most exhaustive series of experiments have been carried out during more than a generation, in respect to the sources of nitrogen as plant food. Numerous divisions, dealt with in the same manner year after year, for that long period, have led to certain definite conclusions. Taking the grass plats alone, the tale that is told is marvellous, and one which even an unpracticed eye cannot fail to see. But when you have the advantage of Sir John as a guide, the interest is heightened tenfold. I had the opportunity, a few years since, of taking the late well-known chemist, W. F. Wigner, President of the Society of Public Analysts, and some other scientific friends, to Rothamsted. Sir John took us round, and everything being at its best (it was in June or July), it was a life-long remembrance to hear the questions which the owner asked, and the answers which the plats before us were compelled to give.

The composition of the drainage waters, under different conditions, has been an interesting pursuit here. And here, too, may be found the most extensive series of rainfall investigations, and of rainfall recording instruments, which the world can produce. Perhaps I have been most interested in two points—first, the difference in the actual results obtained between the ordinary 5 or 8 inch guage and a guage extending to the one-thousandth part of an acre. This shows ten per cent. of an excess over the small guage, on a rainfall of 28 inches annually. And again, the Dalton or percolating guages, to show how much water passes through the natural or unmoved soil at different depths. Of course you descend to underground chambers to read off these unique results. I may add here that the district is a peculiar one, the whole table-land and the adjacent Harpenden valley not having a running stream or brook in it. All the rain-water finds its way into the chalk, and re-appears in the adjacent valley of the Lea, two or three miles away. The Lea is the largest source of the New River, which gives to such a large portion of the metropolis its supply of daily water.

Experiments of equal care and severity have also been extended into the feeding of stock, and in many other ways. But Sir John Lawes—who got the honor of a baronetcy from the Queen a few years since—is no recluse. He is a good neighbor, a good landlord, and "all men speak well of him." Withal a modest man, for he has refused, again and again, to be nominated for the representation of his native county in parliament. He is now, though hale and vigorous, seeking to pull the threads of his many affairs into a compact shape, that there may be no undue fracture when he is removed, or when he may be less able to carry on the present work. His great manure firm, turning out over 50,000 tons of fertilizers annually, is formed into a company. His experimental work is duly provided for, by his having vested one hundred thousand pounds and several acres of land in the hands of trustees, for the special purpose of continuing the series of investigations.

No man has done more to encourage habits of industry and providence among the poor. His development of the allotment system for laborers is well known, and has proved a success. But he has just given a farther lift in the same direction, having this autumn laid aside an additional hundred acres for *petite* culture, at the ordinary rental of the adjacent farm lands. He does not grind the faces of the poor, and the first year each man has the land rent free, with the exception of local taxes.

Nearly every visitor asks the question, when looking at the experiments, "Does it pay?" This is missing the point altogether. Paying, in the ordinary sense, has not been the object in view, but rather the attainment of results that should—on the principle that knowledge is power—put it into the hands of every agriculturist throughout the world to judge for himself what such and such treatment should result in. This he and his able coadjutors have done. The "results," the "summings up" of the many abstruse papers of Messrs. Lawes and Gilbert, are always of she clearest. A wayfaring man, though a fool, need not err therein.

A COMPANY of eastern capitalists is about to be organized for the purpose of erecting elevators along the lines of railroad in North Dakota, which will be conducted on an entirely new plan. They propose to furnish to each farmer a separate bin in which to store wheat, and in this way when he is ready to sell he can always get the wheat which he delivered. They also propose to lend money at 7 per cent interest to be secured by the wheat in store.—*Toronto Globe.*

[Could not our Halifax elevator be utilized in the same way for the benefit of our fruit and potato shippers.]

STEPS have been taken to obtain complete sets of the British American and Canadian Short Horn Herd Books for the Office for Agriculture, so that breeders in the Province requiring information from these publications may have means of obtaining it. In making enquiries correspondents should mention the name and number of the animals enquired about. Where only the name is known, and not the number, the date of calving, or the sire and dam's name, should be mentioned, to prevent mistakes in identifying an animal.

There is also a complete set of the American Jersey Cattle Club's Register in the Office of Agriculture, the ordering of which was one of the last acts of the late Central Board of Agriculture.

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