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Notes by the Way.

"Selection of seed" is very much practised in England. For instance, in the case of barley, grown for the purpose of being converted into malt, many of the farmers of Essex, and other East-of-England counties, sell the whole of their own growth to the large maltsters of Royston, Sawbridgeworth, &c., and buy their seed from the fen-farmers of Cambridgeshire. Poor looking stuff it is, too; but in the uplands of the chalk formation, it finds what it stands in need of, both in climate and soil, and produces the finest malting barley in England.

As we have asked a dozen times: why will not a maltster even look at a sample of barley grown on the "plastic clay" of West-Kent (Eng.), while the same man will jump at on Essex or Hertfordshire barley without seeing it? And yet, we have seen the chevalier barley of West-Kent weigh a pound or two a bushel more than the same sort from the other counties mentioned.

"Rape."—We had a good deal of talk about rape, at the meeting, last month, at the Reburn's farm at Ste-Anne de Bellevue. The report of the conversation, in one of the papers, is rather misleading.

It speaks of "twins and sometimes triplets" being produced by Mr. Boden's (the manager) system of feeding cows on rape before being served. The fact is, that we ourselves were praising rape as a food for "sheep" (not cows) and giving an instance of the great number of lambs dropped per centum of 'ewes,' (nor cows) when our Hampshire-

down ewes were fed on rape for three weeks before the ram was put to them.

Does any one seek to persuade cows to produce twins? Did any one ever hear of a cow producing triplets? It is a common, almost a universal observation, as to twins, than of a bull and a cow calf produced at the same birth, the female is almost invariably barren. With us, in the S. E. of England she is turned a "Free-martin," and we should be very much obliged to Mr. Geo Murray of the Montreal Star, or indeed to any one else, if he would send us the derivation of the term.

"Headlands."—If some of the farmers of this neighbourhood would take a look at the headlands of the fields on Mr. Reford's farm, they would form, perhaps, some idea of how headlands ought to be treated. Those round the great field of silage-corn, close to the station, are sown with rape; it is now some 15 inches high, and will soon be ready for the sheep, if there are any on the farm. (1) As Mr. Risdale, the agriculturist at the Ottawa Experiment farm said at the meeting at Ste-Anne's, the value of this crop is beginning to be appreciated in Ontario, and numerous experiments are being tried at Ottawa on the different ways of growing it: in rows singled out like turnips; in rows left untouched by the hand-hoe; in both cases well horse-hoed; and broadcast. It is now a good deal more than 30 years ago that we first tried to persuade farmers in this province to grow rape. Why we failed to succeed in our endeavour we cannot tell; for a crop that produces as largely as such a trifling cost for seed (8 lbs. at 12 1-2 cents), and requires no hand-labour, like swedes and mangels require, is, it has always seemed to us, one that is especially suited to the circumstances of the French-Canadians, who seem to have an ineradicable determination not to grow roots on account of the "nigging" work of singling. Good, right-down hard work with axe or maul, is all right; but fiddling away at a row of swedes or sugar-beets with a hoe they cannot stand.

(1) There are about a dozen Shropshire ewes, but we did not see them. Ed.

"White-mustard."—As farmers are now inclined to grow green crops for the purpose of being ploughed in, may be allowed to express our surprise at never having seen a crop of white-mustard growing. It is a quick growing plant, and a lean flock of sheep would not quite despise it, if turned on before it grows sticky. Simple enough the cultivation: scarify the stubble and get the couch, &c., off; a shallow furrow of say 4 or 5 inches; a good harrowing, followed by the roller; seeded, broadcast, at the rate of 14 or 18 pounds to the acre; and a couple of tines of the light harrows or of a bush-harrow, if you have nor that invaluable implement, the "chain-harrow," finishes the job.

Care must be taken to sow the "white" kind, as the "black"-mustard, from which the well-known condiment is derived, is mighty apt to become a permanent guest. We remember well that, in 1851, a farmer, about to leave his farm, and desirous of spiting his landlord, sowed the whole of his fallow-shift with black-mustard: we doubt if that part of the farm was ever purged of its invader.

We cannot agree with the well known agricultural writer, Mr. Gilbert Murray, in his opinion of mustard as a food for ewes in preparation for the ram. We infinitely prefer rape, a plant that, even without other food, will "fatten" sheep, while mustard will only just "keep them growing."

"Feeding new grasses."—Mr. Boden tells us that he finds the best treatment for new grass is to feed it the first year, instead of following the usual practice of mowing the first season and pasturing it afterwards. But we need hardly say that, on this farm, a mixture of grass-seed is sown, not, as usual, only clover and timothy.

"Flies."—The cattle on the farm on which we are living, which is surrounded on all sides by bush, are driven almost crazy by flies. A good preparation against the flies is: whale oil and soft-soap, with a moderate quantity of carbolic-acid

Enough soap-suds must be made to "cut" the oil, and the emulsion is to be applied, with a common paint-brush, every three or four days. If it rains, the application must be renewed. An unfortunate Jersey bull here is a perfect mass of bones from the flies that appear to have a peculiar affection for him. The stables and bull-shed, being quite light and with no netting against the fly, the poor horses and the bull were suffering greatly before they were turned out to graze; but since that time they have had a sad time of it. It would not cost much to put a wire fly-proof netting over the doors and windows of the stables, and our valuable, indispensable friends, the horses, would be all the better for such protection.

"Turnips after potatoes.—The turnips sown at our instigation on the 17th July, have done wonderfully well, considering the long drought they have undergone. They were horse-hoed once, singled, rather too late, and are now, September 5th, quite large enough for market—just 50 days from seeding! Not a good kind, we regret to say; but what can be expected from seed picked up at an ordinary chemist's shop?

Quite a common mistake here is to set out turnips too far apart. Large turnips are objectionable, because they are always spongy in the middle, and have no "proof" in them. They are not like swedes, though even they are all the better in quality for being of a moderate size.

"Manure."—Mr. F. Shutt, of the Experiment Farm, has been good enough to send us a copy of his evidence, on "Fertilizers and Food-Products," before the "Select Standing Committee on Agriculture" at Ottawa.

From Mr. Shutt's pamphlet we gather:

That, although rotting manure necessarily causes a certain loss of organic matter containing nitrogen, still, if the manure is kept moist and compact, the loss is not so very great after all, and is partially compensated by destruction of a large proportion of the seeds of weeds that are killed by the heat involved.

Nothing, too, better breaks down the litter and coarser parts of the manure, making it more uniform and more easy to mix with the soil.

The condition of potash does not seem to be in any way improved by the rotting of the manure. Mr. Shutt found the potash in recent or fresh manure as available as it was after rotting. But, as regards phosphoric acid, rotting under the best conditions "does" improve its availability in the proportion of 60 to 75.

After each month's turning, the mixture was carefully made as compact and solid as possible with ordinary means.

It seems, after all, to be enough to treat manure in the way in which every farmer in our part of England used to treat it 60 years ago; the manure was spread regularly, on a 9-inch deep bed of the heaviest soil in the field in which it was to be used, and each carload as it arrived was drawn over the growing heap and discharged in the middle of the bed, whence it was spread carefully at a regular depth. When finished, the sides were neatly trimmed up, and a layer of earth was thrown over the top of the whole heap.

About ten days before the manure was wanted, for turnips or other root-crops, the mixture was carefully turned over, all lumps broken, and the outsides thrown into the middle. A good heat was soon perceptible, the dung became fairly homogeneous, and most of the weed-seeds were; as the subsequent state of the land to which the dung was applied proved; deprived of their germinative power.

Mr. McMillan spoke of the our favorite system of "box-feeding," when the fattening cattle are kept in loose-boxes, about 8 or 9 feet square, sunk two feet below the surface of the soil, the feeding troughs being raised as the litter rose in the boxes. We have kept beasts in such boxes for five months at a time, and they did far better than those of the same age and with the same treatment that were tied up. The dung came out in perfect condition. The late Judge Ramsay built a lot of boxes, at St-Hugues by our advice.

The dung, according to Mr. McMillan, undergoes no fermentation, but Mr. Shutt very properly dissents from this opinion, as all man-

ure is full of living organisms, and fermentation is the effect of these organisms on the manure.

"Rotting manure is of benefit in killing bad weeds?" asked Mr. Rogers. (We should like to see some "good" weeds! Ed.). "Yes," replied Mr. Shutt; "that is one of the advantages; but, unless the rotting is thorough, some of the weed-seeds will escape destruction.

Straw should be cut for litter. It makes it much more absorbent. The only time we ever saw straw cut for litter was at a farm, rented by a Yorkshireman, near London, (Eng.). The dung was taken from the loose-boxes, in a two wheeled cart fitted with a "spreader," something like the modern machine now in use here, and transferred at once to the drills for turnips. The little double-seeder was fixed behind the cart so the whole operation of dunging the drills, covering the dung, and sowing the turnips was completed at once.

Live-Stock.

COMMON DISEASES OF FARM-STOCK.

Indigestion is an infection which is often said to be specially limited to the human subject as a natural consequence of the very artificial character of the food which is consumed, and the extraordinary combination of condiments with which the human stomach is stimulated. To the observant farmer this popular view is by no means the true one. He knows from experience that the lower animals are victims to various forms of indigestion which are often disguised under other names. Horses, cattle, sheep, and dogs are constant sufferers from dyspepsia, although they are not spoken of as dyspeptic subjects.

Those who accept the popular idea that the lower animals are not subject to indigestion, explain the alleged immunity by referring to the natural food on which the animals subsist. It does not however require much argument to prove that this is only true of animals in a natural state, and does not apply to those which live in a condition of domestication, whose food is arranged to suit the views of their owners.

Perhaps the nearest approach to a natural state

in domestication is that which the young animal occupies for the first few weeks or months of its existence, living on its mother's milk. But even at this early period disturbing conditions may be introduced.

Milk is a secretion which is affected in a remarkable degree by the health of the mother. Food and water exercise a material influence on the quality of the fluid, often acting in a way which is not understood, causing changes which neither the chemist nor the microscopist can define.

Some experiments which were carried on some years ago in France led to the conclusion that brewers' grains given to cows produced milk which was unfit for the food of infants and the final result of the enquiry was to show that the child was not merely the most sensitive test for milk derived from cows fed on brewers' grains, but was in fact the only test. The most careful analysis did not reveal any ingredient which could be referred to as the cause of the indigestible character of the fluid.

Foals of a few days old are sometimes sufferers from constipation and likewise from diarrhœa, and later on, while still living on their mothers, they are attacked with colic associated either with constipation or diarrhœa. The veterinary surgeon is sometimes puzzled to account for the attack. The mare seems to be in good health, and no one is aware of the foal having taken anything of an indigestible character. In some cases the nature of the dejections will give a clue. A green tinge for instance suggests that the grass is to blame, while light colored fœces are the most probable result of deranged liver or bad quality of milk.

There is some difficulty in treating cases of indigestion in very young animals, which readily succumb to pain. Sedative enemata are safe and effective in case of colic, as they relieve pain, and afford time for the others remedies to act.

A dose of castor oil (2 oz. to 6 oz. according to age) may be given at once to be followed by an enema of hot water, containing 2 drams to $\frac{1}{2}$ oz. of laudanum, or, if no means of giving an enema is at hand, 1 oz. to 2 oz. of ordinary chalk mixture may be given. If the pain continues, flannels wrung out of hot water may be applied to the abdomen until the pain is relieved.

Calves and lambs suffer from indigestion, and it is not unlikely that the disease will be attributed to any cause but the right one.

How often it is we hear of serious losses among

lamb attributed to parasites. The animals suffer from scouring, become emaciated, and die in large numbers. On *post-mortem*, various parasites are found. In some the whip worm is abundant. Others harbor the broad tape worm. These worms attach themselves to the mucous membrane and cause irritation, and there is no doubt but that the adult worms, which reach the length of 2 to 3 inches, do cause death from debility, even when they attack adult sheep. Lambs may be supposed to suffer to a proportionate extent from the attacks of the young worms of half an inch in length. When tape-worms are very numerous it may be allowed that they set up irritation in the intestinal canal. Still it is to be observed that the presence of any parasite is accepted as a sufficient explanation of the mortality, whereas a closer inquiry into the history of the case would probably lead to a different conclusion. In many instances of deaths of lambs from emaciation, the cause of all the mischief can be traced back to an early period at the time of gestation.

Want of proper warmth and short food in winter time have their inevitable effect, and in-lambs ewes suffer severely from want of sufficient nourishment. a state of things which generally leads to disaster at lambing time. Thus, starvation, to use a plain word, is the real cause of mortality among lambs, and this can be rendered perfectly evident if proper inquiries are made. In a cases in point known to the writer, first in importance, as a matter of evidence, was the fact that where ewes had been properly fed and well cared for during the cold weather, the lambs were all in thriving condition. In this instance the flock had been divided, one half fell into the hands of a shepherd who was exacting in his demands for food for his sheep, the other shepherd was content to leave that matter to chance, and his sheep fared badly; and on one farm there was present the spectacle of one group of lambs in good condition, while the other group, a few fields distant, were dying by scores.

It would have been difficult in some of the cases to prove the negative in regard to the injurious action of parasites; but in other cases, where lambs died in large numbers under the circumstances above described, there were no parasites found on post mortem examination, and, on the other hand, they were found in the pastures, unmistakable signs of the presence of tape-worms attached to the droppings of lamb. The young

animals were however with their mothers, in excellent condition and free from any kind of disease of the digestive organs. These facts have a moral which surely it is not necessary to put into words.
W. R. GILBERT.

CARE OF DAIRY COWS.

[Paper read at the Missouri State Dairy Association by G. B. Lamm, Sedalia, Mo.]

I have divided my subject into two parts, and will treat each part separately:

First Part.—Care of dairy cows for their physical comfort.—A—The amateur in dairying often lavishes money on expensive barns, beautifully painted, and constructed with magnificent proportions; but I have found that comfort can be secured without grand architecture, and even without costly expenditures.

A cow wants a soft, warm bed in winter, clean and fresh, but she cares but little whether her bed be leaves, straw or saw dust. That is left exclusively to the resources of her owner. Her nervous disposition requires protection from extremes in heat and cold, but the covering may be corn fodder, boards or shingles.

Her great distended udder will not allow of abuses, or of long journeys at rapid motion, but of tender treatment when drawing the milk and taking her to and from the pasture.

She is taxed to her utmost in loading the milk with every element necessary for a perfect human food, and excitement disturbs and often retard the process of the perfect elaboration of the milk. During rumination and secreting the milk the cow demands quiet and comfort.

Easy going management and tender and almost affectionate treatment from youth to age, are most conducive to the development of that domesticated nature of the cow which is so much in harmony with our country home life.

The great draughts of pure water which her wants demand, disturb less the equipose of the wonder working processes of her stomach when tempered in winter to about 50 degree.

Her food are relished best in the absence of the festive fly, but she loves the sunshine and shadow, and is not disturbed by the summer breezes and gentle showers.

In winter she seeks the southern exposure to bask in the sunshine for awhile as though there were healing and restoring properties in its rays for her intricate and heavily taxed nature. In this climate, luxury should always be allowed her, and the dairyman who appreciates the ability and vitality of this noble animal seeks in every way to protect her from inclement weather, muddy barn yards, and the cruelty of every enemy, and give her especially the luxuries, pure air, water and sunshine, which nature affords in abundance.

Second Part.—Care of dairy cows for profitable results—While the kind hearted dairyman loves to see the marked features of docility, gentleness and beauty perfected in every individual cow, and while his heart rejoices to know that they are cared for tenderly by night and by day, yet he also studies the properties of foods, grains and grasses, so as to supply the cravings of their appetite with such food as may give him the largest possible returns.

He mixes food for his cows with a master's hand, often deeming it necessary to sell the dairy food he raises on his farm to buy what needs, in order to give her variety and a well balanced ration. This sometimes insures the largest returns for the least money expended, and he knows, or should know, when a cow has the proper food and a fair chance to do her best.

He harvests his crops at the time when they will do the cow the most good, and then feeds her with a liberal hand.

He avoids the ruinous effects of cows hooking each other by removing the bud of the bud of the horn from the calf. This practise has save the life of many of a valuable cow, and more valuable men, and has solved the question of stable building and protection of the weak from the strong. He has his cows come fresh when dairy products will answer best the demands of his market, and saves the waste of over production.

He feeds and milks and salts his cows at regular intervals, because this brings the largest returns, as well as relieves the cow of anxiety. I have seen cows painfully restless because the milker was an hour late. The cow possesses her own devices to get even with

negligence and cruelty, and rewards richly every kindness.

The good milker approaches his cow with a kind word and knows how to press the teat against the palm of his hand with the end of his fingers so as not to injure the cow or make her feel uncomfortable when yielding her milk.

While I would have the best possible environment for my cows, yet I would not feed too high, or give too fine or too rich foods, for my experience has been that it weakens vitality and impairs powers to transmit ability to her offspring. She needs from forty to eighty day's rest every year, and will take her rest as a man takes his—on a vacation and among good things to eat. To care for a dairy cow properly, or to tell others how to care for her properly, one must know her habits, her capacity, her surroundings, the climate she is kept in and what special breed she represents. All these may be known to the owner, and when once known, if she is a good cow, he can make of her a valuable acquisition. To know these things is to study a living subject of vast importance to every home, community or state.

GEO. B. LAMM.

Sedalia, Mo.

THE TREATMENT OF CALVES.

From the economic standpoint calves are one of the indispensable by-products of the stable, which should be turned to the best account to reduce the cost price of the milk which is the principal product.

They are raised either to replace cows that have gone out of service or are destined for slaughter. It is by replacing the bad or the inferior cows of a herd that its improvement can be best promoted and the cost price of the milk reduced. The calves for slaughter would return but a small profit if they did not serve to utilize the skim-milk, one of the important by-products of the dairy, upon which it is always preferable to feed them. This is one of the best ways of turning the skim-milk to profitable account and this fact should not be overlooked. To fatten them with other foods purchased outside or even taken from the farm would not always be the best rule to follow from an economical point of view.

Calves for Raising.—Calves for raising are the basis of the improvement of the herds and the farmer should devote all his skill to their selection, especially then to properly feeding them and to developing the forms and qualities which these animals inherit from their parents and which are chiefly prized. A well selected and well fed heifer should always make a better cow than her dam, so long as perfection has not been reached. It is in this way that the most famous herds have been formed. Selection and raising are the key to the improvement of the herds. We necessarily presume that the farmer can always secure the services of a first class thorough-bred bull.

The basis of the food of calves for raising, during the first five or six months, is fresh skim milk. Good skim milk suffices to give to a calf plenty of bone a strong frame and strong muscles. Too much fatty matter in the milk is not needful for this. The milk should be fed warm at a temperature of about 90° Fahrenheit or blood heat.

Immediately after birth, the calf should be removed to a special stall, far from the mother, whose milk is given to it unskimmed and warmed during about four days twice a day. The hand should be dipped in the milk to be fed to it, the fingers raised towards the top beneath the surface, and they should be given to it to suck. The calf thus quickly learns to drink alone.

The night meal should consist half of skimmed and half of fresh milk, the whole heated to 90° Fahrenheit. Three quarts are sufficient for a meal for a calf of that age, if the animal drinks only twice a day; if it drinks thrice a day, two quarts will be enough. At the start, it must not be given too much to drink, as its organs are not yet fitted to digest a large quantity of milk. The quantity should be gradually increased, according to the appetite which it displays.

At the end of the first month, they are able to take two meals a day of four or five quarts each or three meals of three quarts. The milk should be always given sweet and warm.

If diarrhoea set in, no more than a quart of fresh unskimmed milk from the mother or from another cow should be given and this should be sufficient to cure it if no other food be given. This milk should be warmed to 90° Fahrenheit. For diarrhoea in calves, a new remedy consists in dissolving 15 grains of salicylic acid in a quart of chamomile tea and making the calf swallow this decoction in four doses per day; one fourth of the quart at

each dose. Diarrhoea frequently arises from a surfeit of blood or from the use of milk that is more or less sour.

The calf should be taught to lick a mixture of equal parts of finely ground Indian corn, bran, wheat and flax seed meal. To begin with, a tea spoonful of this mixture is enough and the quantity should be increased progressively. When the animal is two months old, a tablespoonful of the same mixture may be given; at three months, four ounces per day; at five months, eight ounces and at six months one pound. From three months forward, six quarts of milk may be given twice a day.

After they are one month old, the calves may be put into a pasture of about a quarter of an acre enclosed with a moveable fence which may be displaced from time to time to give them fresh pasturage.

When two months old, the calves commence to drink a little water and some must therefore be placed within their reach. In winter, when they cannot be put on pasture, they should, from the age of one month, be fed good new clover hay cut young, the quantity of which should be increased as they learn to eat.

The quantity of food supplied to them should be carefully supervised. There is no danger in giving them too much hay. It is grain especially, which, when eaten in excessive quantity, may do them harm. However good may be the health and appetite of a young calf, it should never be given more food than it can digest on the pretence of making it grow more quickly.

Calves easily acquire the bad habit of sucking each other's ears, when they are several of them in the same stall. To prevent this bad habit, some farmers recommend that they should be constantly kept tied, while others claim that it suffices to tie them during meals and for twenty minutes there after.

When the heifers are six months old and have been weaned, they should be put with the other cows and treated in the same way. The special care they need should last between 9 months. The heifers should be well fed to properly develop their faculties.

"Calves for slaughter." — Calves for slaughter should be treated like the others, but the skim milk may be replaced by boiled

mixtures of different quantities of barley, oats ground flax-seed and bran, the whole diluted to the consistency of milk in a tea made of boiled hay. But as the fattening of calves for slaughter is a good way to utilize the skim milk, recourse should, as a general thing, be only had to these broths when skim milk is scarce or veal commands a good price.

With respect to the feeding of cows and calves, we recommend the dairy manual of Henry Stewart, (New York Orange Judd Company) from which we have derived most practical information.

Swine.

PIG FEEDING IN IRELAND

A great deal has been said and written of late regarding the feeding of pigs. In this country, at least, there are several important points to be settled in connection with the feeding problem. One of the most important is to decide whether soft pork is caused by some other practice followed in this country in raising hogs. Some definite information along these lines will likely be forthcoming before the end of the year. In the meantime the following instructions on pig feeding, given by a well-known packing establishment at Limerick, Ireland, and published in the *Farmer's Gazette*, of Dublin, will be of interest in showing the methods followed elsewhere.

"Pigs should be well fed, but not over fed. A good bacon pig of 12 stone (168 lbs.) ought to be produced in seven months from its birth. It should not be crammed, neither should it be half-starved, but fed steadily and regularly. Pigs fed steadily and regularly will give the most satisfactory results to the feeder when weighed in the factories. A hog which has been half starved at any period of its life, even through well fed afterwards' will do not do so. Feed three times a day at fixed hours; never leave food in the troughs after the pigs have finished. The flesh of hogs is soft and flabby if fed on brewery or distillery stuff, or on turnips or mangels, and is comparison to their size their weight in the scale is miserable. They may deceive (we doubt it) the buyer who buys by "guess," but they will not deceive the scale-weight.

"The best classes of food for pig feeding are: Potatoes (cooked), milk, barley meal oatmeal, crushed oats, pollard, bran, ground wheat, rye meal, Indian corn. The latter should only be used sparingly, and in conjunction with other foods, such as pollard, bran, or milk; and should always be ground as fine as the mill can make it, and thoroughly cooked, otherwise the Indian corn passes through the animal undigested, and to the loss of the feeder. Barley meal need not necessarily be cooked—scalding it will do. It is certainly the best food, except, perhaps, potatoes, for producing pork. Never sell barley of moderate quality to buy Indian meal. Grind your barley, feed it to your hogs, and their weight when dead will astonish you.

"The secret of making money by pigs is not to rush into them, nor out of them. Never keep too many; never keep too few. The fault in the past has been that feeders ran in to buy when hogs were dear, and stayed at home when they were cheap. You will not get well-shaped pigs from a badly-shaped boar; neither will you get thrifty pigs from an unthrifty sow. If you do not keep your pigs clean and dry they will not pay you. A pig, any more than a human being, will not thrive on a foul, damp bed. The best thriving pigs we have ever seen were those produced from an ordinary well-shaped country sow and a thoroughbred York boar. The services of this latter class of animal can easily be had nowadays. A long-legged, ungainly boar will get a leggy, flat-ribbed, cat-hammered, herring-gutted, miserable class of pig, which will pay nobody, and deceive nobody as to their quality, except perhaps, the man who feeds them. The tall, leggy hog was ignorantly thought to deceive the buyer who purchases by "guess," but does not deceive the factory weighmaster.

"No matter how low prices may be, if it does not pay to feed pigs, it certainly does not pay to starve them. The way to have cheap stores is to breed them yourself. If you cannot afford to keep a breeding sow yourself, get two or three of your neighbors to join you, and divide the expense and the progeny. A good sow is easily fed, and is the best savings' bank you can have. The day you buy is the day you sell. If you pay too much for the store you will want (but will not get) too much for the bacon pig. Where a proper sow is kept, young pigs can be produced for 1s. a week of their age, that is to say, eight weeks, 8s.;

10s., and so on, up to twelve weeks. Why should the feeder pay practically double this for them? One great secret of pig-raising is, when the pigs are high in price don't lose your head and throw your money away; when pigs are low don't lose your head and throw your pigs away." *Farming.*

The Poultry-Yard.

FAILURES AND THEIR CAUSE. (1)

It is a strange fact that farmers know less in regard to the management of poultry than should be the case, and the reason is that while they have given their attention to other farm-stock, they have not examined into or studied the matters that belong to poultry raising as a business. In fact it has not been considered at all, but simply an adjunct or a pastime, the consequence being that while the farmer gives his attention to larger stock and learns daily how to manage with greater success he has allowed his hens to manage themselves. The sick horse or cow is a source of anxiety to the farmer, because he has in the animal perhaps a hundred or more dollars invested, and veterinary skill or the experience of the farmer will be used to its fullest capacity in order to avoid loss. Infectious diseases are guarded against, and due precaution is taken to ward off loss. Farmers are learning that there is a profit to be derived from the small things on the farm, and that the capital invested in poultry, though not usually large, is sure to bring in a return, and they are turning their attention in that direction, having the advantage of ready sales at all seasons of the year and home markets; but the long neglect of years places them at a disadvantage, as they find that, while they are familiar with the details of farm management and the care of animals, they are lacking in the knowledge so essential to success with poultry, especially when they desire to venture on the keeping of poultry in large numbers. Without any real experience in that direction, though accustomed to having hens in the barnyards from boyhood, they make many failures that might otherwise be avoided with the possession of knowledge in the matter of poultry raising.

(1) Owing to a misunderstanding, an article by Mr. Andres was published in the No. for September 1st that was intended for this No. Ed.

Failures occur from attempting too much without experience. There are essential details necessary that can only be properly performed by those who are experienced, and the first steps should therefore be gradual. The farmer should learn something of the breeds and their uses. He should know the breeds that will suit his climate and soil best. The best laying breed may prove a miserable failure unless it is surrounded by conditions for success. It is difficult to teach the farmer that the common barnyard stock is not as good as any other. That stumbling block he will not remove, and it is dangerous, for as long as the farmer clings to old traditions and adheres to old customs, he will fail to recognise the importance of improvement in other directions.

Better houses, better breeds, systematic feeding, cleanliness and careful selection of breeding stock are essential, and if neglected; result in failure of the worst kind.

S. J. ANDRES.

Household Matters.

(CONDUCTED BY MRS. JENNER FUEST).

It often happens that people who have a good supply of clothes do not appear to be so much better dressed than their less fortunate neighbours, who have very little.

The latter will feel that their little must be used with the greatest economy, owing to the uncertainty of when more will be forthcoming. Time will be found to hang up and put away all garments not in use, the necessary stitch will be given in time, to save the nine, caused by negligence of this good rule.

Due attention will be given to the careful sponging and ironing out any little creases, so that the garment shall retain its freshness, and not look as if it had been thrown by carelessly in a corner till wanted, or, even worse, have the appearance that it may have been slept in!

A truly refined mind has the desire for nice things and will do much to keep up and enjoy the very best it can get. Trimmings that have become soiled and limp will be replaced, or freshened up, and made the very most of, in fact, no trouble will be spared to make the most of little.

The white skirt, worn by almost everybody just now, if laundried with due regard to its making, will always retain its good shape.

It must be ironed with the greatest care, for after one bad ironing stretched in the wrong place, it will have the appearance of a baggy fall at the back, which no after washing will bring back to its original evenness.

One sees this kind of thing every day in the streets, and very soon the dress will have quite a little train, which looks very ugly on a young girl, and does away with the usefulness of the nice walking skirt for the older ones.

It is in ironing the back part of the skirt that care must be taken to keep the bottom even, and it must on no account be pulled.

If the skirt is pleated at the back, the seam should be well pressed *after ironing* from the band to the bottom, and thus given the same nice hang it had when new.

Those who wish to make the most of their clothes will do well to remember that there are few good materials that will not be all the nicer after careful washing.

Black cashmere, merino, and many others will stand a good washing, and look fresh and well after the process, but on no account should soap be rubbed on the goods.

Make a good warm water lather, put in the stuff to be washed, do not use the wash-board, but draw up and down in the soapy water many times, to work out the dirt. It may be necessary to use two waters, if the dress is dirty, to get it quite clean, after which give a good rinsing in slightly warm water, to get rid of the soap, hang up singly to dry, without wringing, iron, slightly dampen, on the wrong side. To get the best results the whole thing must be done quickly and with care.

Choose a fine drying day, and be sure that the goods are pulled out and stretched evenly in all directions when drying.

A dress that looks shabby and rusty can be brightened up by sponging over in a solution of ammonia, after which iron over quickly with a nice hot iron.

TOMATO EGGS.

Cut three or four tomatoes in halves across, not from top to bottom, remove the pulp, lay the halves on a greased tin, season each, and put a tiny piece of butter in the centre; cover with buttered paper, and bake in a moderate oven for about a quarter of an hour. Beat up two eggs, season with salt and pepper, mix with the tomato

pulp. Melt half an ounce of butter in a saucepan and if the pulp is hard, cook it first in the butter; cook and stir the mixture for a few minutes till set. It may be flavoured with peas, ham, or mushrooms. Fill the halves with it, and garnish with chopped parsley.

STIRRED EGGS AND POTATOES.

Choose four or five rather long potatoes, scrub them well, and bake in the oven till done. Cut out the centre from each, removing the inside to about an inch from each end, prepare some eggs, as for tomatoes and eggs, and fill up the potatoes with them, and serve at once. Choose potatoes that are canoe-like in shape.

GINGERBREAD.

Take one cup of brown sugar, one cup of butter, one cup of treacle, three eggs, one cupful of milk, four teaspoonfuls of ginger, one teaspoonful of ground cinnamon, half-spoonful of ground cloves, three cupfuls of flour. Be sure that the treacle is not syrup, but of the plainer sort. Sift the flour twice, beat the eggs separately and very light, cream the butter and sugar together, and add the spice and soda last, after they are well mixed with the heated treacle. Bake carefully, because gingerbread is the easiest to burn of all cakes. Bake either in a mould or shallow pan, as fancy may direct.

COFFEE ICE CREAM.

Flavour a pint of boiling milk with good essence of coffee (or, if you like it better, it may be flavoured with strong freshly-made coffee), $\frac{1}{2}$ lb. of sugar, and the yolks of 6 eggs; simmer this gently as if you were making a custard, not allowing it to boil; when it thickens, add 1 pint of good cream, stir for just one minute over the fire, then let it get cool, and after that put it in the freezer and freeze in the usual way.

SALAD DRESSING FOR BOTTLING.

Put the yolks of two raw eggs in a basin with a teaspoonful of salt, whisk them well together, then, in small quantities, slowly add one pint of best salad oil. Mix thoroughly, and add a table-spoonful of made mustard, three table-spoonfuls of vinegar, two table-spoonfuls of tarragon vinegar, and, finally, a little cayenne, a little salt, and a

small spoonful of finely-powdered sugar. When all are thoroughly mixed bottle for use.

THERE IS PROBABLY NO OTHER FRUIT that can be so easily grown and that is so universally a favorite as the strawberry, and it is surprising how many country and rural families there are who are without this delicious fruit in their garden. Potted grown plants have a great advantage over layer plants from the fact that when set out in the late summer or fall, they will bear an abundant crop the next season.

ESCALLOPED APPLES.

This is a very nice fashion for serving apples. The sliced apples (the sour ones are best) should be sweetened to taste, and flavored highly with lemon juice, cinnamon and any spice that you like. Put in alternate layers with slices of buttered bread. Fill the dish with hot water. Bake slowly to a light brown and serve with a rich sauce. A prettier way is to halve the apples and omit the bread, having only alternate layers of apples and sugar. Flavor as you like. Bake three hours, closely covered. The apples keep their shape, imbedded in a beautiful jelly. Do not break in taking it out.

TO PRESERVE EGGS.

Eggs are at their cheapest just now, and those who have plenty should turn their attention to preserving a few for winter use. If properly preserved, eggs will keep well right up till Christmas time, when they are dearest, and at the same time greatly in demand. Such eggs are good even for boiling, but they have a tendency to crack whilst cooking, which spoils an egg for looks and flavour. This difficulty, however, may be speedily got over if the thick end of the egg be pierced with a fine needle; then the preserved egg will boil as satisfactorily as one which is new-laid. For the preserving process, take three pounds of quick-lime, one ounce of salt, one ounce cream of tartar, and one-and-a-half gallons of boiling water. Put the dry ingredients into an earthenware pan, pour the boiling water over, stir well, and when it is perfectly cold commence putting in the eggs day by day whilst new laid, keeping a cover over the pan. This latter precaution must on no account be neglected. You will find the lime will sink to the bottom of the vessel, but this does not

matter in the least if the liquid covers the eggs. Do not forget that the eggs must be entirely covered with the liquid and the cover left on.

LIME WATER FOR INFANTS AND YOUNG CHILDREN.

The two ingredients are distilled water and quicklime, the first being quite as important as the latter, for if you make the compound with ordinary water, it may be highly dangerous in place of beneficial to children. Get one pound of good, fresh lime, put it into a metal pot, and pour over it half a pint of water; this is to slake the lime. Next take two ounces of the slaked lime and put it into a gallon of distilled water, which should be contained in a glass-stoppered bottle, which you can purchase at any chemist's for very little when buying the distilled water. Shake the lime and water well together for two or three minutes, then let it rest for twelve hours, after which you can draw off the clear solution with a syphon as required for use; or, if you prefer it, transfer the clear solution to another vessel, rinse out the sediment left in the bottle, and returned the prepared lime water, which must be kept always carefully stoppered.

The Garden and Orchard.

(CONDUCTED BY MR. GEO. MOORE).

PHLOX DECUSSATA.

Late blooming Garden-Phlox.

Few garden flowers are more satisfactory than the Phloxes, they are thoroughly hardy, adapt themselves to any good garden soil, are neat and compact in their growth and last a long time in bloom; no class of plants have been more improved by the skill of the hybridist. The most noted European horticulturists, chiefly the German, turned their attention to the production of new varieties and the poor purple, lilac and pale pink sorts have been superseded by brilliant shades of rose, salmon, deep red, and bright purple, the size, shape, and density of the truss, and form of the flowers have been brought to the greatest perfection, some with glowing crimson centres on white ground and some delicate pink with a white eye, and others, the purest white, the diversity of

color in the different varieties is most effective when masses are planted, and we know of no hardy perennials so well calculated to render the flower garden pleasing and attractive during the



Hybrid Phlox.

late summer and autumn, at the same time they are not expensive and a whole collection may be secured for a few dollars.

THE NATURAL SCIENCES IN PUBLIC SCHOOLS.

Instruction in the natural sciences, a knowledge of which is essential to success, let the future profession or trade of the pupile, be what it may, has been too long neglected in the public schools.

Children should be early taught the simple elements of natural science by the most easy and intelligible methods. In country schools this instruction may be more readily imported from an agricultural stand-point. The probability is that agriculture will be the pursuit of the majority of the boys, and many of the girls may, in some way, be identified with it; and even if this is not so, the knowledge will be useful in any occupation, or at least will help to expand the intellect.

Intellectual training is more important than imparting mere technical knowledge, and there is no study so well calculated to discipline the mental faculties as that of nature.

The time to bend the twig is when it is young, therefore children should be taught the bases or fundamental principles of natural science among their first lessons, neither should progressive in-

struction in it cease, until their education is finished.

Children in the country will be familiar from the earliest infancy with the natural objects by which they are surrounded: the springing grass, the opening bud, the wonderful advance in growth of plants and animals from embryo to fruition. The danger is that this very familiarity will cause these productions of nature to be treated with indifference, and their existence looked upon as a matter of course. But when children are taught something of the marvellous development of living things from a scientific stand-point, they will take a new and practical interest in all which are brought under their notice. They will no longer be in the position of the rustic, thus described by Wordsworth:

A primrose by the rivers brim
A little primerose was to him
And it was nothing more

but every way-side flower will have a new charm, and every life an inspiration not before dreamed of. Suppose for example we take a common field-plant to illustrate a lesson in plant life at the different stages of its growth, and show how its development, unchecked by accident, disease or lack of necessary conditions, is certain although gradually unfolded, we as gradually lead the student to a full comprehension of the laws which govern vegetable reproduction and growth. Who shall say that such teaching has not a most salutary effect upon the mind of the pupil and will not be likely to influence his conduct in future life. Neither is the utilitarian aspect of the subject to be overlooked, because a farmer well grounded in the principles of natural science will the better understand the processes necessary to accelerate growth and increase soil fertility by artificial means, and the rules to be observed in the proper management of animals.

Knowledge is power; and to know why a certain operation should be performed is a great help to the intelligent performance of it and to the successful result achieved. Hence, the use of the natural sciences applicable to the cultivation of the land and the care of live stock.

It is not necessary perhaps that a farmer should be entirely proficient in any of these—a professor of any of them can devote his life-time to that alone and then leave something to be learned—but it is possible by a course of study to gain a knowledge of first principles which will be of the

greatest service in the every day practice of future life, and these are what should be taught to the young while the mind is in a receptive or plastic state so that they will form a basis of action when the necessity arises for giving effect to the knowledge thus acquired.

GEO. MOORE.

**EXHIBITION OF FLOWERS AT L'HOTEL
DIEU DU SACRE - CŒUR,
QUEBEC, 1899.**

Oh were I in some distant land remaining,
And far away for Temples or Divines,
I still could find, in Flowers of God's ordaining,
Priests, sermons, shrines.

Besides the means which the Church uses for the conversion of sinners, the all wise Father has appointed other means which are potent sometimes to accomplish the same result or at least to assist in doing so, and while we are taught the mercy of God we are also or should be impressed with the greatness of this country in the beauties of nature. The Heavens are telling the glory of God and the sweet flowers of Earth are no less reading silent homilies to the observant soul, or chanting glad anthems in His praise. It is well understood now that flowers exercise a refining and elevating influence on the human mind, and there are some well authenticated instances on record of the most depraved having been touched and awakened to their true position by the sight or perfume of some little way-side flower, which has led to their reformation and the abandonment of vicious habits and pursuits. Appreciating this, the Revd. Ladies of the Sacred Heart, Quebec, have turned their attention to the cultivation of flowers, and as a means by which they could raise funds to enable them to carry on their noble work of ministry to the sick and needy. Having been successful as florists, they have this year been holding an exhibition in the seven greenhouses attached to the Hospital garden. During the several weeks it has been open, it has been visited by great numbers who have greatly enjoyed the treat thus prepared for them.

Too much cannot be said in praise of the display nor of the enterprise, skill and indefatigable energy of the Revd. Sisters, and their evidently highly efficient, intelligent and most enthusiastic gardener, M. George E. Gagnon. In many respects the show was much more interesting than a floral exhibition in which the plants are brought to-

gether for a day or two, and have to be hurriedly arranged. Here, the plants are all seen growing together in rich profusion and producing by contrast and harmony a well studied pictorial effect as a whole, and yet the plants are not so crowded as to prevent a due inspection of each individual specimen. Here, the student of Nature can find food for knowledge and reflection. The Lily in all its purity, delicacy or brilliancy of colors, more beautiful than those in which Solomon was arrayed. Plants too which are associated with the dearest legends and experiences of the Christian faith, as for instance that which is commonly called the Crown Cactus, because it is believed that from it the "Crown of Thorns" was made. If however is not, properly speaking, a Cactus, but a Euphorbia a genus nearly allied to the Cacti. It is an *evil* looking plant, its stems being covered with dangerous spines, and its flowers of a bright red color growing amongst them, might, by a little stretch of the imagination, be taken for drops of blood. On entering the first greenhouse, the visitor is greeted by an elegant specimen of the new Begonia, President Carnot, with its large bunches of delicate flesh color, waxy blossoms. This is the Queen of the Begonias, of which there is a large collection here, and it is one of the best window plants, being easy of culture, comparatively free from insects and nearly always in bloom. Of curious and economic plants we noticed the Rubber tree, *Ficus elastica*, *Cyperus*, *Lago* and many other Palms. *Caladiums*, *Arrowroot*, *Dracœna*, the night scented *Jasmine*, and the elegant climber *Salamun Jasminades*, which no one, admiring its graceful festoons of rich green foliage or jewel-like blossoms would suppose belonged to the same family as the homely but indispensable potato.

Here is also a very excellent collection of Fans; including the one so popular in the United States, about which there is a craze, as it would appear, for no American home is considered complete without its "Boston Fan," and the grower devotes himself and his extensive plant houses, exclusively to their culture, disposing of many thousands annually.

But the most interesting specimens to a connoisseur at the Sacred Heart are two distinct varieties of the well known Norfolk Island Pine, *Araucaria excelsa*. They exceed this elegant tree in beauty by their deep green color and graceful habit of growth. The two plants were brought

and presented to the Ladies by a missionary priest, about ten years ago, and are very rare if not unique on this Continent.

Altogether, the whole collection bespeaks that the utmost skill, judgement and care are continually lavished upon it, and the flower, fruit and vegetable gardens are equally creditable.

Smilax is extensively grown for decorative purpose, and a variety of floral designs, tastfully and artistically made, add to the attraction of the display. The venture to hold such an exhibition was a bold one but a capital idea and greatly to the credit of all concerned. It is gratifying to add that the public appreciation of it was such as to maintain the hope that it may be continued annually.

The Farm.

IS A MODEL FARM.

*Visit to Mr. Robert Reford's Stock Farm
at St. Anne's.*

*By Members of Ottawa Experimental Farm
Staff and Gentlemen Farmers.*

There are more things in the world than are dreamed of in most anybody's philosophy, not only Horatio's, and the party of newspaper men who went out to Mr. Robert Reford's stock farm at St. Anne's yesterday, saw and heard of things that were quite entirely revelations to them, even if one or two of them did come from the country in their youth.

The science of farming and stock raising has become a science indeed, and if it doesn't thrill the world at periodic intervals by discoveries of the phonograph, verascope and wireless telegraphy, it at least goes ahead in a quiet methodical and positive way of its own, which is not to be despised.

That much, at least, was impressed by a tour of Mr. Reford's farm, and if any still remained not altogether convinced of the efficacy of certain methods of feeding to produce twins and triplets or only single calves (as was left to be inferred from the bucolic disquisitions of Superintendent Jas. Boden), they at any rate were not prepared to deny that it might be so. And certainly Mr. Boden's practical application of his scientific ten-

ets, in a stock-raising way, had results to show—for such cattle and hens and sheep and pigs as those which browse and cackle and nibble and root on the Reford farm at St. Anne's are not to be seen every day.

There was quite a gathering at the farm in question yesterday. Mr. A. G. Gilbert and Mr. G. S. Grisdale, of the Government Experimental Farm at Ottawa, came down from the Capital to take a look over it and see what there was to see—and they saw. Mr. Jenner Fust, editor of the JOURNAL OF AGRICULTURE, also dropped in to get a few subjects for the editorial pen—and he got them. Mr. George Muir, Mr. D. Fraser and Mr. Adams, gentlemen farmers all, like-wise came over to gather in a pointer or two—and they gathered. Mr. Boden, the superintendent, was uniform in his courtesy and ubiquitous in his solicitude, and every-body saw whatever his individual curiosity led him to want to see, and heard all there was to hear about it.

Mr. Reford's farm is certainly a model establishment. It is now about six years since he acquired the three hundred and odd acres which now make up the farm, and in that time the process of evolution from a more or less desert wild into one of the best appointed stock farms of the Dominion has been rapid and constant. The cattle are all pure-bred Ayrshires—there are 64 head of them—and there is not the equal of the exhibit in Canada. Last year they took no less than 34 prizes at the exhibitions in Toronto, London and Ottawa, seventeen of which were firsts. While the cattle are the chief attraction of the farm, there are all some very fine Shropshire sheep, and pure-bred pigs and poultry.

All the buildings of the farm are of the very latest and best construction, and excited the admiration of the gentlemen from the Experimental Farm, who quite candidly admitted that Mr. Reford beat the Government. Not a vestige of dirt escapes the eagle eye of Superintendent Boden, and cows and hens and sheep, even the mud-loving pig, have veritable little parlours and drawing-rooms to lounge in when they're inside.

Star.



SPRAYING FOR MUSTARD.

By Frank T. Shutt, M.A., Chemist, Dominion Experimental Farms.

One of the most persistent weeds that farmers in many parts of Canada have to contend with is mustard, commonly known in Europe as charlock. Though an annual, it is most difficult to eradicate from fields in which it has become established, owing to the fact that the seeds—of which a large number is formed—are endowed with a strong vitality and are preserved, by the oil they contain, from decay until favorable conditions for sprouting occur.

Pulling the mustard when it appears among the grain or keeping the weed from seeding by working the land (as under a hoed crop) are the two methods which have hitherto been in vogue to exterminate this pest, and when the work is done thoroughly they may be considered satisfactory and efficient. The former however, is always costly, and the latter is sometimes not convenient. When, therefore, it was announced in the *Agricultural Press* that spraying, with certain solutions of sulphate of iron and sulphate of copper, had been tried successfully in England and France, it was deemed advisable to make similar experiments here. We should then be in a position to furnish information at first hand on this subject.

The fields of the Experimental Farm being free from this weed it became necessary to make the trials upon an adjoining farm, and for this purpose a field of barley was selected which showed a considerable amount of mustard. The size of the plot treated in each case was one-tenth of an acre, and the quantity of solution uniformly supplied to each area was five gallons or at the rate of 50 gallons per acre. The date of spraying was June 28th, the grain being from fifteen to twenty inches high and the mustard practically the same height and just coming into flower. The chief data may be briefly stated as follows:

"Sulphate of iron, 5 per cent.:" No effect upon barley. The leaves were practically all stripped from the stems of the mustard, but the weed was not killed, as evidenced by new leaves subsequently starting, the plant flowering and the seeds-pods filling out and matur-

ing. The leafless stems were quite green a fortnight after the spraying and were, apparently, furnishing nourishment to the seed.

"Sulphate of iron, 10 per cent.:" A slight scorching of some of the leaves of the barley was to be noticed. A fortnight after the spraying this was not discernible, and though this spray may have "slightly" retarded growth it is not probable that the yield of grain was affected.

"Sulphate of copper, 2 per cent.:" A certain amount of injury to the leaves of the barley resulted, evidently retarding growth to a somewhat greater degree than the 10 per cent. iron sulphate solution. At the end of two weeks, however, this effect had practically all disappeared, and it became doubtful if there were any permanent injury to the grain. The mustard very quickly and markedly showed the effect of the spraying, both the stems and the leaves dying without allowing the plant to vital.

Though the effect upon mustard was more pronounced than in the foregoing instance, as noticed by the "spotting" on the stems it was not sufficiently strong to prevent flowering and the ripening of the seeds, a large proportion of which proved, upon testing, to be *see*. Two weeks after spraying, a few living mustard plants were found in the plot, but it is believed they had escaped the solution owing to the height and overshadowing of the barley.

"Sulphate of copper, 5 per cent.:" This solution damaged the barley in a much more pronounced manner than the preceding solution; in all probability it somewhat lessened the yield of grain, though, as the ground was very uneven in character, no comparative data on this point could be obtained.

The mustard was all killed; an inspection two weeks after the spraying did not reveal any living plants.

In order to ascertain the effect of these solutions upon this weed at a younger stage of growth than that just reported upon, mustard seed was grown in rows in a plot upon the Experimental Farm. When the mustard plants had reached the height of six to nine inches they were sprayed as follows:—July 20th: "Sulphate of iron, 5 per cent.:" Not all

killed; the few survivors possessed green stems and in time sent out new leaves. It is extremely doubtful, however, if the plants will have sufficient strength to flower. "Sulphate of copper, 2 per cent.:" All the plants died within a few days.

July 22nd: Further sprayings were made. "Sulphate of iron, 5 per cent.:" The stems were stripped of all their leaves, but in the course of dew weeks fresh leaves had appeared on many of the plants. "Sulphate of iron, 10 per cent.:" Though somewhat more severely attacked than by the 5 per cent solution, there was sufficient vigor left in many of the plants to send out new leaves, after a few weeks.

"Sulphate of copper, 2 per cent.:" Only a very few of the older and more vigorous plants escaped destruction, probably not more than three or five per cent. than three to five per cent. This solution is evidently strong enough to kill all mustard plants six inches in height and less.

"Sulphate of copper, 5 per cent.:" All the plants killed.

From the above data, I make the following inferences:

1. That a two per cent. (2 p.-c.) solution of sulphate of copper (that is two pounds in ten gallons of water) is, all things considered, the most effective, safest (as regards the grain crop) and most economical to use. The spraying should be done thoroughly, and for that purpose fifty gallons per acre will be required. If a heavy rain follows the spraying within twenty-four hours, the operation will be required to be repeated.

2. That, in order that the work may be effective, spraying should not be delayed after the mustard plants have reached a height of six to nine inches. If allowed to grow taller than this, stronger solutions would be necessary and in larger quantity, as the grain would then largely protect the mustard.

For many valuable suggestions and much assistance in the work I am indebted to Mr. W. T. Macoun, horticulturist of the Experimental Farm, who concurs with me in the deductions drawn from this investigation.

STATE OF THE CROPS.—PACKING FRUIT, ETC.

To the Editor of the JOURNAL OF AGRICULTURE.

Dear Sir,—The farmers in the south and west end of the province have all finished harvest, with the exception of buckwheat. North and east of Montreal, there is quite a good deal to do yet, although the season is well advanced, the season has been a short one, late spring and an early autumn, have cut a little off both ends. With perhaps the exception of around this section, it has been a very good season, grain has turned out better than was expected. Wheat is giving a good yield here and I believe in Manitoba an extra one—when the yield is good, the quality is always excellent.

Oats.—In some places they were rusted, but not very generally—turning out very well, will be an average crop.

Barley.—This crop has done fairly well, not a great quantity sown now since the prices have gone down.

Peas.—There will be a fair crop of this grain, better than for several years, some places struck with mildew.

Buckwheat.—Doing fairly well, it is in a very critical period just now, the hot rays of the sun having a great effect on it, rather early to speak of how it may turn out.

Corn.—With the great heat since my last letter, corn has done exceedingly well, the crop will be a good one. A good quantity of ensilage corn was sown this year, some made the great mistake of purchasing poor seed, that had been heated.

Potatoes.—Are a good crop, not much word of the rot, as I mentioned in my last, the immense crop of tops is quite general throughout the province.

Roots.—Have done well, are still growing, would be the better of some more rain.

Apples.—The apple crop will not be a very large one in this province at all events, but of excellent quality, with very few spots. As regards packing, I would say that they should be graded as to size as well as to quality. Putting in all large sized apples in one barrel or package, and then size smaller but sound by themselves, the damaged fruit and windfalls could be put all together and sold as such. If the Canadian people ever want to get a good name for their fruit in the English market, they must see that all fruit

is carefully picked and sorted. In bygone years, the custom too often has been to put nice apples on the top of a basket, or in the top end of a barrel, and fill up with any sort of trash. In England, I believe apples are sold by emptying out the whole contents into a sheet and then sold, this is a fair and equitable way of doing. The government, last year, graded the fruit as follows:

Good fruit, sound, of small size. . . . No. 1
 " " larger " A. . . . No. 1
 " " very large, Extra No. 1

In order to get a good price for our apples or fruit of any kind, we must get the confidence of those whom we expect to consume our fruit. The people of California know how to pack and ship fruit. There have been a good many thousands of dollars paid for California fruit in Montreal alone.

I hope and trust these few words of advice will be taken in a friendly way by those who in the past have picked and packed fruit for market and may continue to do so.

Butter—What is the matter with our butter shipments this year so far? they are some 136,000 more than last year at the same date, and last year was a record year, there has been paid out for butter more than last year, one million five hundred thousand dollars—and how about the price—how is 23 cents for high? as the slang phrase goes, and I believe there were certain factories sold at that recently.

Cheese.—About the same state of affairs rules in the cheese market as has in the butter. The shipments are some 144,000 boxes more than last year, and the price fully one cent a lb. dearer on the average than last year, take the increased shipments and the difference in price from last year, means some one and three quarter millions dollars more in the farmers pockets.

Farmers, now is your time to make money: with 23 cent butter and 12 cent cheese, we are back to olden time prices. Horses are selling at a good price, eggs ditto, hay is a fair price. The farmers ought to be cheerful these days, study economy, and there is no danger for this Canada of ours.

Yours truly,

PETER MACFARLANE.

Chateaugay, 31st August 1899.



VALUE OF HUMUS IN THE SOIL.

Through continuous cropping without following any systematic rotation, the fertility of many of our lands has been impaired. The yield of crops has shown a constant diminution, yet much more marked where no returns were made to the soil in the shape of fertilizers. Such lands, where the crop has fallen below the profit margin, are termed exhausted. But must we understand that these lands are completely deprived of these four elements, necessary to plant growth, viz Nitrogen, Phosphoric acid, Lime and Potash? No, these are still present, and in large quantities in most of our so-called exhausted lands. Only one element is lacking, which can easily be replaced. This is the Humus, or that black earth so plentiful in our virgin soils. This substance is formed by the decomposition of all vegetable or animal remains: leaves, roots, etc. During long years it has been considered as of little value, as an unimportant element. But now, before the light of science opinions have changed. It is acknowledged that upon this humus depends almost entirely the fertility of our soils.

Humus is in the soil the storehouse of nitrogen, an element for which a high price must be paid if bought as a chemical fertilizer. In decomposing under the influence of the air, humus slowly liberates this nitrogen, which, if conditions are favorable, changes into nitrates readily available. Other gases are liberated at the same time, which attacking some compounds, hitherto in a potential form, also render them free to concur in the nutrition of plants. Thus, humus is a direct and indirect fertilizer; direct in giving out nitrogen, indirect in rendering other elements available.

In its effects towards improving the physical conditions of the soil, humus has no less importance. Like lime, it lightens heavy soils augments their porosity and facilitates the circulation of air therein. It gives also more consistency to sandy lands, preventing leaching, and in both cases enables the soils to absorb and retain more of the sun's heat by darkening their color.

Last but not least comes the water, holding power of humus which has been estimated at

100 p. c. of its weight. Thus, soils containing a large proportion of vegetable matter are much less liable to suffer from drought than those deprived of it by careless cultivation. The cracking of the land in dry weather, which occurs so frequently in run-out heavy soils, is thereby prevented, as humus, owing to its great absorptive power does not bake and become hard, but remains spongy.

We can see from this rapid review how desirable is the presence of organic matter in our soils. No land can be fertile without it. It is therefore of the utmost importance for every farmer to study the means by which humus can be returned to the soils and its loss prevented. Then only can fertilizers be applied to the soil, if needed, with some chance of profit.

Humus can be restored to the soils by the use of farmyard manure and by green manuring. But the first, no matter how carefully kept, is not always in sufficient quantity to supply the needs of the soil. We must then have recourse to the latter, which consists in burying down a crop sown for that purpose. Leguminous crops, such as clover or peas, which join to the advantage of a vigorous growth that of gathering an extra supply of nitrogen from the air, are the most satisfactory. But clover will not grow on lands nearly destitute of humus. On such it must be preceded by rye or buckwheat which have a stronger power of attacking potential plant-food. This stock brought to our command, we are enabled profitably to manufacture the raw material of the soil into a product for which there is a demand.

When the growth of clover has been rendered possible in our soils by the addition of humus, our supply of this element is not likely to run short, if carefully managed. Clover grows strong fleshy roots which in decaying enrich the soil with organic matter very rich in nitrogen. On some farms very good results have also been obtained in plowing down a second crop of clover once in the rotation. At the Ontario Agricultural College, clover occupies the land 2 years in a rotation of 4. The second year's growth is left as a pasture and plowed down in the fall. By this method lands formerly considered as exhausted have

seen their fertility restored.—Where manure is scarce, 2 or 3 pounds of clover seed per acre may be sown with each grain crop and the clover plowed under (very shallow) in the fall. Surprising results are obtained from this practice. (1)

Thus, in order to maintain the supply of humus a systematic rotation must be followed in which clover will make up for the deficiency of farm yard manure. Frequent deep plowings must also be avoided for they tend to deplete the soil of humus and turn the valuable portion of the surface soil out of the reach of plants. If necessary the sub-soil plow should be used, but on an ordinary loam, the strong roots of clover will loosen the sub-soil, and shallow cultivation only will be required.

CHAS. MORTUREUX.

STATE OF THE CROPS IN JULY.

(From the *Depart.—Bulletin*).

Grains.—The average for the province of the appearance of the grains is 74 for wheat, 77 for barley and 80 for oats. Last year, at the same date, it was 78 for wheat, 82 for barley and 87 for oats. It is therefore slightly lower this year. In the 2nd and 8th groups, that is to say, in the older parts of the province, it is lowest, and in Bonaventure and Lake St. John it is highest as in former years. This is a constant and noteworthy circumstance. Does it originate in the fact that the farmers in the older parishes are closer and more exacting in judging the value of their crops than those in the new parishes? I do not think so. It is probable that it arises from exhaustion of the older lands and their insufficient manuring, while the newer lands still retain all their richness.

At this time last year the average for oats at Lake St. John rose to 93, and at Bonaventure to 92, while in the Eastern Townships it was only 73.

Little rye is sown; for this grain the average is 73

Buckwheat.—Nothing particular; general average, 74.

Flax.—General average, 73.

Peas and beans.—If the appearance this year be compared with that of past years, it will be

(1) And the frequent repetition of clover will obtain results still more surprising. Ed.

remarked that it is still in the groups occupying the middle of the table that it is best.

Indian Corn.—As regards Indian corn, it is the contrary to the case of the grains that happens. It is in the Eastern Townships and the older parishes that it succeeds best, probably because the farmers there know best how to grow it. The general average of the appearance of this crop is 75 this year against 79 last year.

Mangels, Carrots and Swedes.—The crops of these have a pretty uniform appearance all over the province. This appearance comes close to the average; it is 72 for mangels, 71 for carrots and 73 for Swedes, against 79, 78 and 80 last year.

Potatoes.—The potato crop will be good, speaking generally, all over. Its appearance this year is 84 against 91 last year. It is the crop with the highest average this year, and it is in the 7th and 9th groups that it has the best appearance.

Fodders and Pastures.—The general appearance of the fodders and pastures is very inferior to that of last year. Its average is 76 against 92 last year. It is best in the counties of Beauce, Lotbinière, Levis, Dorchester and Bellechasse, and worst in the district of Montreal and the Eastern Townships.

Tobacco.—The tobacco crop promises badly everywhere: average, 64.

Apples.—The crop of apples is the worst of all and far below the average. Its average is only 55.

Information received from correspondents.

Rigaud, (Vaudreuil).—Hardly any apples are to be seen.

Roxton Pond, (Shefford).—The meadows are very inferior to what they were last year. The apple trees are nearly all ravaged by caterpillars. On the whole the meadows and grain are rather backward and the crop does not look as if it would be as abundant as last year.

St. Valérian, (Shefford).—The new meadows are fine and the old ones bad.

West Wickham, (Drummond).—The caterpillars have ravaged the apple trees—

St. Pierre, (Montmagny).—The appearance of the grain is middling. The last rains in June damaged them. Numbers of field mice and grubs eat them as soon as they rise. The potatoes sown early look well; those sown last show many empty spaces.

Calumet Island, (Pontiac).—The crop will be up to last year's average, except that wheat is affect-

ed by rust. On high land the crop is good and it poor on low land. Now as Calumet Island is very hilly, the crop is therefore uneven. There will be only a weak fruit crop owing to the ravages of the caterpillars. For my part, in particular, I have no reason to complain. I used the Bordeaux mixture.

Green Island (Temiscouata).—It is rather early to be able to judge by appearances what the crop will be; still every thing appears under the best conditions. The last rains have done an immense amount of good to the pastures and meadows, some of which were beginning to suffer from the rather prolonged drought we had. The crop of fruit will be almost nothing; however, I must say that but little of it is grown here.

St. Agapit (Lotbinière).—Grain and hay generally have a fine appearance and so have the pastures; but the vegetables are not so fine. A great many farmers in the parish complain that these are destroyed by grubs, especially tobacco, swedes and turnips. The fields that have not been attacked by grubs are fine.

Our fruit trees are full of caterpillars and our poor farmers have great difficulty in saving them. Some have used Paris green and have derived benefit from it.

Some farmers also complain that a small insect very much like the sheep-tick, but somewhat smaller, attacks the swine. Some have been obliged to wash the young pigs because they were wasting away notwithstanding the care taken of them.

If you know of any means of destroying these insects, please inform me; it would be a great service to our farmers.

St. Anne de Bellevue, (Jacques Cartier)—Owing to the drought the hay crop will be almost nothing; some farmers will not even mow it. The fruit trees, especially the apple trees, have been damaged by caterpillars. Peas and potatoes look well. Oats promise a little, but the crop will be very middling.

Pierreville, (Yamaska).—I have the honor to report that the seeding was very successfully got through in very dry weather.

Grain, in general suffered from drought in the month of May, especially in heavy soils, but the gentle and beneficent rains since the last week of May have brought up the grain well and its general appearance is very good.

The people here, being encouraged by the good

wheat crop they had last year, have sowed more than double the quantity this year so as to buy less flour than in the past.

At present wheat, barley, oats, flax, peas, beans, Indian corn all look well and lead us to hope for a good crop. Everything seems to depend upon the weather we may have, for the grain has come up well and no one complains of vermin in the soil.

No rye is sown here as the soil is not suitable for it; we are about to sow buckwheat; not much will be sown because people have had very favorable weather for sowing all the other kinds of grain that are more certain to yield a crop.

Beans and potatoes look very well and the potato-bug is coming. Beets, carrots and swedes suffered from the drought and look middling; turnips are not yet sown and few people sow them because they are liable to be eaten by the yellow fly.

Green fodder looks very well.

The clover meadows are very fine.

The timothy meadows a year or two old look fairly well; the older ones are poor. The abundant hay crop we had last year must necessarily have produced exhaustion in all the meadows and especially in the older ones. Mixed crops for green fodder look well and are not yet all sown.

The pastures are excellent so that we should have a considerable quantity of dairy products.

Tobacco planting has only just begun; the apple and plum trees suffered from frost when in blossom and there will be hardly any apples and plums; the other fruit trees will yield fairly well.

The Dairy.

THE ECONOMICAL UTILIZATION OF MILK.

Among the ordinary methods of utilizing milk which have been practised for any length of time, I would say that the three most commonly practised, are, the sale of milk for direct consumption, the manufacture of butter, and the manufacture of cheese.

It is claimed that the sale of milk for direct consumption is the most lucrative. This method of distributing milk is widely practised wherever a dense population causes a large

demand for fresh milk. The price per 100 lbs. of milk is, under these circumstances, always at least approximately as high as the average price obtained by manufacturing it into butter or cheese. It increases, of course, as the expenses in its distribution increase. It must be only when the development of the conditions of trading does not keep pace with the growing demand, that the price of milk can exceed the above limit. According as the supply is lightened, facilitated and rendered cheaper, so is the field extended for which the sale of fresh milk is the proper and economical method of milk distribution. The question then presents itself to farmers who make butter, whether they should still continue to do so; or whether they should give it up and sell the milk. This question is decided very easily by anyone who has a well-kept farm. He has simply to calculate the highest limit of value which under the most favourable circumstances, he can obtain per 100 lbs., calculated on the basis of its composition.

This is furnished him by an examination of his accounts, as well as by a statement of the total expenses which he may incur in its distribution, and then he may compare these sums with the market value of 100 lbs. of milk. The disposal of milk by selling it in a fresh condition necessitates only a slight expense in utensils, and is accompanied by little risk. It also affects the management of a farm very little, so long as the consumer is quite indifferent to the quantity of fat and total solids contained in the milk, and it keeps the capital of the farm circulating quickly and regularly throughout the whole year. All that is necessary is to regulate the time of cows calving to suit the trade, and to see that the necessary food is supplied at each season of the year, so that a uniform quantity of milk be provided throughout the whole year. This method of utilizing milk is as well suited to the small farmer as the large, with the exception that the latter has this advantage over the former, that he can distribute his larger amount of milk over wider areas at the same expense per 100 lbs. This way of disposing of milk is not well suited to the raising of calves. It must also be born in mind that where the milk is sold off the farm, all the

mineral constituents of it are lost. An increased price can under certain circumstances be obtained for milk by sterilizing it, or by exercising that amount of care which is necessary to fit it for sale in milk-curing establishments or in the rearing of children. If this be done, however, a considerable increase of expense is incurred in plant.

On dairy farms, where the sale of fresh milk is, for economical reasons, impossible, the attempt is generally made to utilize milk by manufacturing it into butter, to a far greater extent, than by manufacturing it into cheese. The reason of this is chiefly, but not entirely, due to the fact that butter is the most largely required milk product. It is also to be considered, that the variation in the percentage of bacteria in the milk, due to the utilization of the most widely different kinds of food, does not affect the preparation of butter—a fact which until recently was rarely noticed, and which at present can be rendered of little effect by pasteurizing the cream, so that the preparation of butter is, to a large extent, independent of certain changes which affect the preparation of whole milk cheese. Finally, it must not be overlooked that the preparation of butter demands more care and attention than peculiar skill. On account of these facts the preparation of butter is a very widely practised art.

The utilization of milk by manufacturing butter requires a larger expenditure in plant than the sale of milk; it does not obtain so quick or so regular a return of the capital employed. In dairy-farming, this method for the disposal of milk is not so popular, since it requires more attention to the feeding of milk cows, more time and knowledge for its supervision, more human labour, and lastly, special arrangements for disposing of the bye-products. By the sale of the butter, practically no mineral constituents are removed from the soil of the farm. The keeping qualities and the large demand for butter offer many commercial advantages. For one thing, the product may be temporarily stopped if the times are unfavourable. For another thing, more distant markets may be sought. When butter is prepared, the rearing or fattening of calves or of swine is carried on, or, less frequently,

the preparation of skim-milk, when all bye-products, both of the butter and the skim-milk, are utilized for feeding pigs.

The manufacture of butter may be effected on a small scale as well as on a large scale, but is more lucrative on the latter scale. The prices of the butter market show that butter made in large dairies, is, on an average, better than that prepared in small dairies. On farms, it is not, as a rule, convenient to churn every day.

The fact that the practice of making whole milk or fatty cheeses is less extensive than the making of butter, is due to the fact that the former method of utilizing milk is largely influenced, as I have pointed out, by certain local conditions, as well as by the fact that the art of cheese-making not merely requires aptitude and care, but involves reflexion, skill, experience. Fatty soft cheeses are almost less easily kept and less in demand than salt butter.

Only certain kinds of fat hard cheeses are unconditionally superior to butter in this respect.

It may be regarded as beyond doubt that the ripening of cheese is effected by bacteria. On the one hand, we know that the different kinds of bacteria exercise different kinds of actions, and on the other hand, that certain kinds of cheeses are characterized by particular properties. From this it may be inferred that the ripening of each kind of cheese, is dominated by a particular kind of bacteria. If this is correct, it follows further, that each kind of cheese will be most successfully manufactured when the proportions of the kinds of bacteria implicated in the manufacture of the cheese are present in the right quantity. Since milk leaves the cow's udder free from bacteria, it follows that nearly all the bacteria which lodge in it are derived from dirt, which comes into it chiefly in the form of cow-dung. The bacterial percentage in dung depends directly on that in the food, and this is influenced indirectly by the manuring and by the different kinds of food. In districts where manures of the most various kinds are applied, and in which not only the kind of feeding but also the condition of the fodder varies on different farms, and in the course of

a year even on the same farm, to a considerable extent, the percentage of the bacteria in the milk must be naturally subject to great variation. If this is the case, the ripening of cheese, when the method of treatment remains the same, cannot possibly be of a uniform nature. These conditions are most active in the case of the preparation of the best hard fatty cheeses, which ripen slowly. They have little effect, on fat soft cheeses, the ripening of which begins on the surface and develops towards the centre, nor have they much effect on skim-milk cheeses. It is a fact, that summer cheeses are better than winter cheeses, and cheeses made in those countries with which the manufacture of the cheese has been long associated are better finer than those made in other countries.

Good butter finds a ready market everywhere, but the different kinds of fat cheeses are not equally liked in different localities. It is, therefore, of the highest importance in the manufacture of cheese to ascertain exactly what the taste for cheese is, and only to prepare cheeses which are in demand, and which are thus sure of a market. It must also, however, be clearly understood that it is necessary to make cheese of a good quality, and not to think that is easy of accomplishment. For this purpose, in deciding the question of whether it is more advantageous to make butter or cheese of this or that kind of different fat cheeses, it is also necessary to consider along with this general question, others connected with the economic side of the question, and especially the local and natural conditions influencing the exact bacteriological condition of the milk, which produce in different districts and countries the predominant flavour. It is also necessary to consider the absence or presence among the people of a cultivated taste for cheese.

If the trade in whole-milk cheeses requires less capital involved in plant than in butter, it nevertheless requires a large circulating capital, as it is accompanied by more risk, and the money is returned more slowly. For this reason, however, it is suited for a wider utilization of milk, since the manufacture can be stopped at any time without disadvantage, and the preparation of butter and the manu-

facture of skim-milk cheese can be substituted. When cheeses are sold off the farm, a not inconsiderable portion of mineral salts, consisting chiefly of "calcium phosphate," is removed.

H. WESTON PARRY.

Aug. 29th, 1890.

INFLUENCE OF TEMPERATURE ON THE RIPENING OF CHEESE.

By *Emile Castel.*

The value of cheese, such as we find it on the market, is subject to many variations; this is due to the difference of quality, and this again is due either to the use of faulty milk in the making of the cheese, to the want of skill in its manipulation, or to the defective installation of the department wherein the cheese is placed for ripening. Though all these factors are of vast importance, the first and the last are of greatest importance, and it is to them that must be chiefly attributed the loss which now occurs, under the present commercial conditions.

The conditions necessary to the good working up of the milk are generally pretty well understood, and the losses due to this source usually spring from want of care more than from ignorance. But with the process of ripening, it is not so. There, we have still many difficulties to overcome, given our ignorance of the changes produced, and until we have more information on this matter, the results obtained will most frequently depend upon purely empirical methods of working.

It is impossible for us to estimate, even approximately, the extent of the losses that the State of Wisconsin alone suffers, on account of the want of proper arrangements for the ripening of its cheese. Experts estimate these losses at hundreds of thousands of dollars a year. If these losses absorb so large a proportion of the profits that this trade ought to realise in Wisconsin, what must be the state of things in those parts of the country, that do not possess the same advantages of climate.

Still the natural conditions existing in our State are far from being ideal. In the ordi-

nary riping-rooms, no effort is made to control the temperature, and, in consequence, its fluctuations in these rooms are almost the same as out of doors. The reports furnished us by the pupils of our dairy-school of the most striking features of the present conditions of their factories, contain the following information for the month of July, 1897. In the best factories, those that have cellars and sub-earth ducts for the ventilation of their ripening-rooms, the fluctuations of temperature were about 10 degree F., 65 degree being the maximum; the temperature in one ripening-room, fairly ventilated, where no precautions had been taken to lower the temperature, varied from 20 degree to 30 degree F. In the majority of the rooms, no attempt at isolation has been made, and the temperature rises to almost the same degree as that of the exterior air. Not only in this maximum too high for ripening cheese (104 degree F. was observed in one factory, and in many more, upwards of 90 degree), but the sudden changes of temperature are still more dangerous.

The effect of such high temperatures is very injurious to the quality of cheese, which loses in value not only by the melting and exuding of the fat, but also by the damage caused to both texture and aroma by these abnormal heats. In the following diagram the variations of temperature, taken in a badly built ripening-room, are shown in comparison with those taken in the cheese-cellar of our dairy-school. The line B.B. shows the fluctuations of temperature that too often take place in our ripening-rooms; the more the pernicious effect of these high temperatures is decided, the darker are the lines that represent it. It is worth remarking, that the ripening cheeses were never in a proper temperature, except for a small fraction of the three days occupied in the investigation. This diagram represents the real conditions observed in September, 1897. There is no doubt that, if these observations had been made in the summer, the cheese would never once have been found to be in a temperature really favourable to its ripening. As opposed to the line B.B., the line A.A. represents the condition of temperature which reigned during the same length of time in our own cheese-cellar. The effects of

perfect isolation opposing itself to the fluctuations of temperature are thus graphically demonstrated.

We can then divide the variations of temperature generally occurring into three zones, more or less well defined. 1. Variation of temperature, invariably injurious, starting from the maximum limit, which may be reached at 100 degree F., falling thence to as low as 75 degree, according to the kind of cheese made. 2. An intermediate zone, starting from the above minimum limit down to the point where no injurious effect is noted. This zone, that may be called "hazardous," varies from 75 degree to 65 degree F. 3. A lower zone, at which favourable results are always arrived, embraces the lower temperatures up to 65 degree F. Naturally, the cheese cannot ripen in the neighbourhood of the freezing point, but we have, in our experiments, succeeded admirably with cheese ripened in a temperature of about 40 degrees F. The chief objection at so low a temperature is the time it takes to finish off cheese. People say that very low temperatures, especially at the beginning of the ripening, are injurious to the aroma, and impart a bitter taste to the cheese. It is for this reason not considered safe to put cheese at once into cold-storage.

To settle the conditions of good ripening, the Madison Station undertook a series of 5 experiments, in each of which from 3 to 5 cheeses of normal size were made, with mixed milk, under exactly the same conditions of making. It was not until the cheeses were taken out of the press, that they were put to ripen under different conditions. At regular intervals, the cheeses were examined as to quality, and analyzed both chemically and biologically. We shall not enter into the details of these analyses, but limit ourselves to giving the results as to the commercial value put upon the cheese maintained at different temperatures. The difference of the temperatures to which these cheeses were exposed, made them ripen more or less rapidly, so that it would be necessarily unfair to compare them directly with one another by judging them all on the same day. If they are judged very soon, the cheeses kept in cold compartments would be too green to please

the market; contrariwise, if the judging is postponed until they are in good order, those kept to ripen in a high temperature would be found to be already too far advanced; but in our case, it invariably turned out that whenever the cheeses were kept for a long time, the result was that the cheeses were kept for a long time, the result was that the cheeses ripened in a low temperature were of excellent quality, while those ripened in a high temperature were manifestly inferior, both as regards texture and aroma. These cheeses ripened in a low temperature were quite as good as those ripened in the normal temperature, although the time required to complete their ripening was of course longer. Thanks to the courtesy of Prof. N. J. Noyes, of the Ohio dairy-school, we were unable to obtain a perfectly unbiassed estimate of the trade-value of the different cheeses. Prof. Noyes fixed the value of the cheeses ripened in the cold-storage at 7 3-4 cents, while those ripened in a high temperature were rancid, and not worth more than 3 to 4 cents a pound, the cheese ripened in the normal temperature being worth a trifle as much as those ripened in a low temperature. At the time of the valuation, the best cheddar was quoted at 7 1-2 to 8 cents. Prof. Noyes remarked, that the difference in value was due entirely to the effect of the mode of ripening, the flavour and texture being injured by the high temperature, while the cheeses ripened in the cold-storage were quite as good as those ripened in the ordinary or normal temperature.

Practical conclusions.

1. "Influence of temperature on the period of ripening."—A-High temperature materially accelerates the changes that ripening produces in the cheese. At a temperature of 85 degree to 90 degree F., the softening of the casein, mesyred by the soluble proteids formed, travels 2 or 3 times as far in the first few days of the ripening as in cheese kept at a low temperature (50 degree to 55 degree F.), but, finally, cheese kept at a low temperature ripens more completely than cheese kept in a higher temperature.

2. "Influence of the temperature on the quality of the product."—Cheese ripened in a high temperature (about 70 degree) is inferior

to cheese kept in a lower temperature; even at or about 50 degree, no ill effects are found. Cheese ripened in a high temperature were found to have suffered, not only in texture, but also in aroma; they have a piquant or sharp flavor, very perceptible, which is often met with in cheese coming from a bad ripening-room, where the temperature is, most of the time, within the hazardous or detrimental zone.

Cheese ripened at 55 degree F., and below, is invariably of good quality, although mild in flavor; it is entirely free from any bitterness (this contradicts the usual opinion), and compares very favourably with cheese kept at 60 degree to 65 degree F.

The relative humidity of the air in ripening-rooms kept at a low temperature is generally greater than in ordinary ripening-rooms; whence it follows that cheese put into a cold ripening-room never has a rind so solid as is desirable. Such cheese also moulds much more. Still, a good rind can be had by keeping the cheese for a few of the earlier days in a warmer, drier room.

3. "Relation of temperature to the loss of weight."—The average loss of weight in Cheddars is about 50 p. c. It is due chiefly to the partial drying of the cheese. At a high temperature, this drying goes on rapidly, and is accompanied by a considerable loss of fat, which escapes from the cheese on account of its liquid state. In a low temperature, there is no escape of fat, and the dryig is greatly diminished.

4. "Relation of the temperature to the period during which cheese lasts fit for market" (Quality of keeping).—Cheese ripened in a high temperature attains maturity rapidly, but only lasts in its best condition for a time relatively short. Its "commercial period," therefore, is short. Cheese, ripened in a low temperature attains maturity more slowly, but as its quality is generally much better, and as its "commercial period" lasts much longer, the lengthened time occupied in its ripening is fully repaid by the extra value of the product.

