

Our recognized primacy of reputation in the English markets has not been gained without persistent efforts, guided by intelligence and good judgment. Some years ago the highest possible price was not realized for our finest cheese in Liverpool or London, except under the blind of an American brand. It might be a more truthful, though less courteous construction to put on that unpardonable practice of some years ago, were I to say that many of our finest cheese wore the American brand, because of the status in the market which their superior quality gave to the name thus unfairly stencilled upon their boxes. The good sense universally accredited as the dairyman's trait of character, prevented any international complications from arising out of that one-sided business. Probably the acquisition of equally prudent judgment by the other classes of the population on both sides of the line may soon raise fishermen and politicians to the dairyman's plane of thinking and action. Then would follow speedily as well as mutually satisfactory and honorable settlements of all international disputes.

In the infancy of our cheese business the quality of the product of many of our factories was lamentably irregular and defective. The English markets offered an outlet and created a demand for the surplus of your dairy products as well as ours. To thoughtful men it was at once evident that the demand was practically limited only by our joint capacity to furnish uniformly fine food in the form of cheese at moderate prices. Every pound of poor, sour, hard, indigestible cheese that is sold to anybody shuts off the demand for at least three times as much cheese of fine quality. For that reason every dairyman is interested in the quality of the cheese made anywhere, when it finds its way to the plate of the consumer.

The Dairymen's Associations have been principal agencies through which the information indispensable to our progress was spread. Their annual conventions offered opportunities for the interchange of newer knowledge; and what had been before only detached theory, or hazy idea, was often by discussions shaped into definite information of real value. Then itinerant instructors were employed to visit as many factories as possible and to give actual demonstration of the best methods of handling milk, curd and cheese. The worth of that system was so generally recognized that its extension was desired. During the past season, eight persons holding the joint office of milk inspectors and cheese-making instructors, were employed by the Dairymen's Associations of Ontario. The expenses have been met from a fund formed by a grant from the associations, supplemented by contributions from the factories receiving the benefit of such services. The results have been satisfactory where competent men were employed. The inspection of milk, and the conviction and exposure of patrons who furnished it adulterated, have had a very wholesome effect on its general quality and condition. In the spring of the year, district dairy conventions are held for the particular benefit of cheese-makers. Occasional bulletins of timely information are issued from the Dairy Department of the Ontario Agricultural College. Through central meetings of patrons, and the medium of Farmers' Institutes, helpful information on the care of milk and its preparation for cheese factories is circulated. Dairy literature in the press of the day has done us excellent and commendable service. These are the important organizations and agencies through which our cheese-making progress has been aided.

A few words may be devoted to an explanation of the theory of Canadian Cheese-making before I proceed to discuss the details of the best practice. Long experience has demonstrated certain methods to be well adapted to the certain production of fine cheese when the milk is all right. But as the raw material of the cheese-maker—the milk of cows—is seldom in precisely the same condition of quality upon two consecutive days, he should be able to intelligently modify the details of any method to meet the peculiarities of the milk he handles. As the work of dairying becomes extended, it seems that milk has new parasitic foes.

Some taints are growing undesirably common. Gassy curds, which years ago were the rare exception in a well managed factory, are now very general. There is an ever-increasing need for the dairyman not only to know the routine of the best processes, but to understand the "whys," "wherefores" and "wheres" of all parts thereof.

As related to the food consumed for its production, and to the conditions under which it is ordinarily given, milk is perhaps the most variable of all the

animal products. The milk of cows in the best of health, fed on the most suitable of feed, and with every condition and influence favorable for its production, is a most complex compound of compounds.

Dissolved in about ten times their weight of water, there is a mixture of casein, albumen and sugar, which holds in suspension from 3 to 5 per cent. of butter fat in the form of small globules from the fifteen hundredth to the fifteen thousandth of an inch in diameter. Such in a sentence is milk as the cheese maker needs to know it.

Besides its inherent tendency to decay, milk is a liquid most susceptible of contamination by any impurities that may be adjacent to it. It offers the many germs of destructive ferments with which the ordinary air swarms a most inviting and favorable field for their multiplication and operation. Hidden under the evident purity of its snowy froth, float the agents that immediately begin to work for its decomposition. Other organisms that live by its destruction are sown into it, ere ever the tiny stream from the milker's hand strikes the pail. This, then, is the perishable compound at its best, which it is the cheese-maker's business to preserve in a palatable nutritious condition at its best for adult human food, conveniently prepared for transportation.

The reduction of the bulk of the milk by the separation of part of its water is the first essential step in the process of cheese making. This should include or be followed by such a treatment of the portion retained for cheese as will make it most valuable in the food markets.

By rennet coagulation, parts of the milk—mainly its casein and part of the fat which the casein envelopes—are separated from the water which still holds the albumen and sugar in solution. The nature of such coagulation, to put it in other words, is to solidify the curd out of its state of solution in the milk. Such solidifying or coagulation of the casein thereby encases in it the globules of fat suspended in the milk. After the rennet coagulation is perfect, 100 parts of the contents of the cheese vat may be described as

92 parts liquid composed of { 87 parts water.  
  { 4 " milk sugar.  
  { 1 " albumen.  
mixed with  
8 parts insoluble curd composed of { 4 1/2 parts casein.  
  { 3 1/2 " fat

These two composite parts of coagulated sweet milk are together really as a mixture of two compounds. The means whereby the separation as to contact is to be effected may be classed as mechanical and chemical. The mechanical means include the cutting of the curd to facilitate the passage of the liquid portion—the whey—out through the insoluble mixture of casein and fat. There is apparent need for perfect coagulation before the cutting is commenced, thus the fat globules will be firmly held while the watery compound—the whey—is being separated out from contact with them.

The cutting should be fine enough to permit and promote easy and sufficient separation without disturbing or destroying the physical structure or texture of the curd. The formation of a skin on each particle of curd causes the whey to be filtered through. Stirring the curd is undertaken to hasten and help the separation. Heat is applied to complete the coagulation—the firming and the drying of the curd. A temperature over 98 degrees leaves the casein less suited for the solvent action of subsequent fermentation. Sufficient moisture should be left in contact with it to permit of all the casein becoming easily soluble.

Among the chemical or vital means used to effect this separation between the soluble and insoluble, is the development of lactic acid. Its presence renders the casein less soluble. At the same time it promotes separation of the whey out from the particles of curd. When acid is developed to excess, the cohesion of the molecules of curd is weakened.

Lactic acid prevents the development and operation of the putrefactive ferments; it also makes slow the process of curing fermentation by which the casein is made soluble in the cheese. The degree of acid development will not be excessive if the separation of the whey out of the curd be well effected before it begins. The addition of salt arrests the action of the lactic acid in the curd. It also retards the curing fermentation. In the autumn months there is need for the addition of more salt than during the summer. Such extra salt will give a full, safe, keeping flavor and a slow curing, firm body.

In barest outline I have touched upon the theory of Canadian cheese making. I have supposed the milk to be in its normal or best condition; good, pure, sweet and from healthy cows. Much of the milk offered at factories is not of that quality. If the milk be tainted when drawn from the cow, the taint will be due to (1) volatile oils from her feed; (2) the presence of villriones or other ferments from the air, the water or the feed; (3) to disease on her body.

Aeration of the milk is beneficial treatment in all of these cases. The presence of oxygen from the air prevents the villriones from becoming active. The cooling of milk prevents the vigorous or quick action of the microbes that split the sugar into acid, and also retards the action of other ferments. Age, to the extent of twenty four hours, permits the preparation of the milk for a ready separation of the solids for cheese from the watery portion, by promoting to helpful degree the energies of the lactic ferment.

Tainted milk is with difficulty coagulated. I do not understand why, but I think that part of the casein has been decomposed by the microbes, the cause of the taint.

I have learned to use an additional quantity of rennet in such milk. The putrefaction of the casein or any nitrogenous matter in the milk which is not coagulated is very easy and rapid. Bad odors and bad flavors always result from such decomposition. Often cheese goes off flavor from the imperfect coagulation of the casein.

(To be continued.)

### Silo Building.

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#### LOCATION OF SILO.

When possible the silo should be located in the feeding barn, since it not only brings the cost of building within the reach of everyone who is really in need of a silo, but greatly facilitates the handling of the ensilage when feeding it out. Depth in a silo is always preferable to breadth, so that in the case of basement barns it is advisable to let the silo reach from top of barn posts to the ground floor of the basement; a door or opening can then be made from the silo directly into the basement where the ensilage is to be fed. The next best location is adjoining the feeding stable. In most dairy stables the cows are stanchioned in two long rows facing each other, and, whenever it is possible, it should be arranged so that the silo can be entered from the end of this feeding alley; a wooden track can be laid along the centre of the feed way and into the silo, upon which a low wheeled car can be operated to distribute the feed. If the silo building is located entirely separate, it should be planned to load the ensilage into a cart which can be drawn into the feeding barn, thus delivering the ensilage with little labor directly to the cattle. The idea of convenience should not be lost sight of, for by exercising a little thought and judgment the labor of waiting on the stock through the long feeding season can be greatly reduced.

#### FORM OF SILO.

In a square silo less lumber is required and less ensilage is exposed to the walls in proportion to the capacity than in a long narrow building; it is the part of economy to retain as nearly the form of a cube as the location and other circumstances will admit. Theoretically a circular silo comes the nearest to perfection, for this form requires the minimum amount of material and does away with the corners, in which there is always more or less decayed ensilage, but as we have had no experience with this form of building nothing can be said about it at this time.

#### BUILDING THE SILO.

The following detailed description of how to build will apply to the outside silo, built separately or as an annex to the stock barn.

It is always the part of wisdom to provide substantial foundations for farm buildings that are intended to be permanent, and the silo is no exception. An 18 inch stone wall should be laid deep enough in the ground to be beyond the action of frost, and raised high enough above the surface to admit of sufficient grading to divert all surface water; if the location be a high and well drained one there will be no necessity for raising the wall more than 6 inches above the surface. In digging the trenches, throw enough earth inside to raise the silo floor up to the top of the stone wall. Upon this stone foundation a sill made of three