

very great practical importance. Another point demanding attention is the location of the pigpens. I am glad to say that no modern built factory tolerates the pig-stye in its neighbourhood. The greatest caution should be exercised in having all the surroundings clean, sweet, and free from taints. In conveying milk to the factory, injury is often done by putting it when warm into cans with close fitting covers, and hauling it long distances in the heat. The milk ought to be spread out and cooled in some way before it is put in the cans. On arriving at the factory it is usually run into the vats at once, whereas it should be spread out in some way on a broad surface, and gradually flow into the vat from the opposite end of such broad surface. Even by such a crude process a large amount of impurity would be got rid of. The inventor who will get up a simple and practical machine for exposing newly-drawn milk to the air, and freeing it from its animal odour, will at once make a fortune out of it. There is no doubt but the exceedingly fine aroma which is obtained in the best samples of Stilton, Cheddar, and Cheshire cheese, is secured by manufacturing perfectly pure milk at low temperatures. In all the finest English cheeses that have come under my observation, the temperature in setting ranged at about 78° to 82°, never above 84°.

At this point in the address, Mr. Willard described at some length the Cheddar system of cheese making, and showed that it did not differ materially from the system in vogue at our cheese factories. Summing up, he pointed out the following as the main principles applicable to our own practice.

1. Studying the condition of the milk.
2. Setting at a temperature from 78° to 82°
3. Drawing the whey early.
4. Exposing the curd longer to the atmosphere, and allowing it to perfect its acidity after the whey is drawn.
5. Putting in press before salting, at a temperature of 60° to 65°.

6. Grinding in the curd mill, and then salting.

These last two items are important, because you cannot regulate the salt accurately by guess, and can only get the right proportions by a uniformity in the condition of the curd. The application of salt at a higher temperature than 65° is claimed to be prejudicial. I am firmly of opinion that the exposure of the curd in small particles to the atmosphere is beneficial, and helps to secure good flavour and mellowness of texture. The philosophy of this is easily explained, since it consists of the process known by the name of oxidation, and by which the earth, air, and sea are purified from contamination. Dairy men and manufacturers will do well to study the philosophy of their business, to get hold of principles, and not follow rules in a blind, mechanical way. We, in the old dairy districts of New York, are just beginning to discover some of the errors which I have pointed out. You will do well to profit by the lessons we have been sixty years in learning.

Mr. WILLARD next proceeded to discuss the subject of butter-making, which, he said, has of late become one of great importance. The cheese factory system has so far cut off the production of this article that prices have advanced in the fine qualities to a pitch rendering this branch of the dairy business exceedingly profitable. Indeed, there is a prospect of its being made more remunerative than cheese. In Orange County, N. Y., long famous for its excellent butter, there has recently been introduced a system of jointly manufacturing cheese and butter. The system has proved a great success, and is being rapidly introduced into other parts of the country. It is a decided advance on all previous methods, and produces an article of a quality equal to that obtained from the most noted butter districts of Europe. No people on the face of the earth are more fastidious as to their food than the better classes in London, England. Possessed of immense wealth, they pay liberally for extra qualities of food, particularly the products of the dairy. Good butter they will have at any cost. Their finest grades come from the Continent—Normandy, Holstein, and the Channel Islands. It is worth to-day 140s. stg. per cwt., or about 30 cents gold per lb. wholesale; while Canadian sells from 64s. to 90s. per cwt., and Irish extra brings 108s. to 112s. I have seen and tested immense quantities of Normandy and Holstein butter in London. It is excellent in flavour and texture, very lightly salted, and of a rich, golden colour. I saw them making butter for the Queen's table at the Royal dairy near Windsor Castle. The milk is set in porcelain pans, resting on marble tables. The walls, the ceilings, and the floor of the milkroom are of china, and the arrangements for ventilation are the best that can be devised. Fountains of water are constantly playing on all sides of the room, which helps to maintain an even temperature. The churn is of tin, and the butter is worked with two thin wooden paddles. The whole establishment, from the milkroom to the

stables, is the most perfect specimen of neatness that can be imagined. I need not say that the butter is excellent.

Mr. WILLARD then gave a minute account of the entire system of Holstein butter-making, drawing chiefly for his details on a communication addressed to the Right Hon. the Earl of Erne, by the Secretary of the London Board of Trade. The particulars began with the care and feeding of cows, which were elaborately described, and then dealt with the manufacture, packing, shipping and marketing of the butter. Extreme cleanliness and regulated temperature are the prominent points in Holstein butter-making.

Returning to the new American system of butter-making, which is now becoming widely practised, Mr. Willard remarked that it rests mainly upon five great principles. 1. Securing rich, clean, healthy milk—milk obtained, if possible, from rich old pastures, free from weeds. 2. Setting the milk in a moist, untainted, well ventilated atmosphere, and keeping it in an even temperature while the cream is rising. 3. Proper management in churning. 4. Washing out or otherwise expelling thoroughly the buttermilk, and working so as not to injure the grain of the butter. 5. Thorough and even incorporation of pure salt, and packing in oaken tubs, tight, clean and well made. Cleanliness in all the operations is of imperative necessity; while judgment and experience in churning the cream and working the butter must, of course, be had. What really distinguishes the American system is the manner of setting the milk so as to secure an even temperature, and in applying to butter-making the principles of association, so that the highest skill in manufacturing may be obtained—in other words, the inauguration of butter factories. In these establishments the milk room is constructed so that good ventilation is secured. It is provided with vats or tanks for holding water. These are sunk in the earth in order to secure a lower or more even temperature of water, as well as for convenience in handling the milk. The vats should be about six feet wide, and from twelve to twenty-four feet long, arranged for a depth of eighteen inches of water. There should be a constant flow of water in and out of the vats, so as to secure a uniform temperature of the milk after it has been divested of the animal heat. The milk is set in pails eight inches in diameter and twenty inches deep, each holding about fifteen quarts of milk. As fast as the milk is delivered, the pails are filled to the depth of seventeen inches, and plunged in the water, care being taken that the water comes up even with, or a little above, the milk in the pails. The temperature of the water should be 48° to 56°. A vat holding 2,000 quarts of milk should have a sufficient flow of water to divest the milk of its animal heat in less than an hour. Good, pure milk, will keep sweet thirty-six hours when thus put in the vats, even in the hottest weather. When milk is kept for thirty-six hours in the water, nearly all the cream will rise. The Orange Co. Dairy men claim that it all rises in twenty-four hours. They say, too, they can get as much cream by setting in pails on the above plan, as they can when the milk is set shallow in pans, and the cream is of better quality because a smaller surface being exposed to the air there is not that liability for the top of the cream to get dry, which has a tendency to fleck the butter and injure its quality. The old notion that cream cannot rise through a depth of milk greater than seven inches is believed to be an error. The new system secures what was so difficult, if not absolutely impossible on the old plan, uniformity of temperature, so that the dairyman has perfect control of the milk. The Orange County butter-makers, after trying a great variety of patent churns, find none which they like so well as the old barrel dash churn. At the butter factories they use the barrel and half size, and about fifty quarts of sweet cream are put into each churn. The cream is diluted with water, by adding cold water in summer and warm in winter, at the rate of sixteen to thirty quarts at each churning. The temperature of the cream in summer when the churns are started is about 60°, but in cold weather they are started at 64°. In warm weather, ice is sometimes broken up and put in the churn to reduce the temperature to 56°; but it is deemed better to churn without it, if the cream does not go above 64° in the process of churning, as butter made with ice is more sensitive to heat. It requires from forty-five to sixty minutes to churn, when the butter should come solid, and of a rich yellow color. It is then taken from the churn and thoroughly worked in cold spring water. In this process the ladle is used, and three times pouring on water; generally all that is required. It is then salted at the rate of eighteen ounces of salt to twenty-two pounds of butter; if intended for keeping through the winter a little more salt is used. The butter, after having been salted and worked over, is allowed to stand in tubs overnight, when it is worked a second time, and packed. A butter

worker consisting of a lever fastened to an inclined plane is used for working the butter. It is packed in 60 lb. pails or firkins of white oak, made perfectly tight and strongly hooped to prevent all leakage. They are three times thoroughly soaked before using, first in cold water, then in hot water, and finally in cold water again. After being filled with butter they are headed up, and strong brine is poured on the top to fill all intervening spaces.

The skim milk left after taking off the cream for butter-making is turned into skim cheese, but I shall not dilate upon this part of the business. First class butter is made at these factories, butter which tops the market in price, wherever it is known. The Orange Co. factories are provided with cool, well ventilated cellars, which are indispensable to the butter-maker. I strongly commend this new system of butter and cheese factories combined to the attention and consideration of Canadian dairymen.

Re W. F. CLARK moved, seconded by E. V. BOWELL, Esq., M. P., That the cordial thanks of this Association be tendered to X. A. Willard, Esq., for his able and interesting address, and that it be requested for publication.

Both the mover and seconder of the above resolution addressed the meeting at some length, remarking on several points of importance included in the address, and urging on the dairymen present attention to the valuable counsels they had heard.

The resolution was then put and carried unanimously, after which the Association adjourned to meet at 9, a.m., on Thursday morning.

On Thursday morning, Feb. 6th, the Association met soon after 9 o'clock, pursuant to adjournment. The discussion on making cheese once a day was resumed for a short time, and various opinions were expressed as to the use of ice, a decided preference being expressed for a stream of cool water underneath the vats. At ten o'clock the order of the day was called up by the Chairman, and Mr. Willard proceeded to give a variety of statistical tables, which, though prepared for the New York Convention, he said might be of service to Canadian dairymen, if in no other way, by giving them examples for the preparation of similar tables here. The importance of having a statistical circular was also shown, and, in general, the advantages which must accrue to dairymen from being posted in regard to factory production and market prices. Mr. Willard stated that considerable depression existed among the New York dairymen from the fact that cheesemaking appeared to be no longer a paying business. He would submit some figures on this subject which New York dairymen considered pretty near the mark. It takes on an average 200 acres of good land, including the wood lot, to carry forty cows, together with the usual supply of teams and sprinkling of young stock. Now at the average of forty cows at 400 lbs. per cwt., a liberal estimate among factories, we have 16,000 lbs., which at fourteen cents per pound

Amounts to	\$2,340
Out of this amount must be deducted for	
manufacturing cheese at 2 cents per lb.	\$ 320
Caring milk	60
Labor, 1 man 1 year	300
Hired girl 1 year	150
Extra work in haying	60
Board of help at cost	200
Salt, plaster, &c.	60
Blacksmithing, wear and tear of utensils,	
waggons, harness and repair buildings	200
Average depreciation of stock	100
Taxes	100
Insurance and incidentals	60

\$1,590 \$650

I put the farm at nothing, the stock and utensils at nothing, and have reduced the hired help to the utmost limits, on the supposition that the farmer and his family are strong and healthy, and able to do more than hired help. I have supposed the farmer to raise his own flour, grain for the stock, and that household expenses are paid by sales of odds and ends from the farm. Thus estimated, we have the enormous sum of \$650 remaining, out of which the farmer is to clothe himself and family, and pay all the miscellaneous expenses of his domestic establishment. No margin here for the purchase of camel's hair shawls, or investment in lands or stocks.

At the close of Mr. Willard's statistical details, the Association resumed the discussion of the topics on the programme.

7. Best stock for dairy purposes.

Mr. HAMILTON spoke in favor of the Ayrshires, and recommended crossing the best native cows with good Ayrshire blood.

M. JAMES did not agree with the previous speaker as to the Ayrshires. He was in favor of an infusion of Short-horn blood into the native stock of the country. He believed, however, that quite as much depended on the feed as on the breed. Cows must have