

in values can be effected by close attention to temperature and moisture. The correct temperature for the curing room is from 60 to 65 degrees Fah. Ice is useless for maintaining the proper temperature in summer in the ordinary curing room. The best results can be secured only with insulated walls and floors. An insulated wall should have six ply of building paper, separated by two ply of lumber, strips of wood and a dead air space. The best ventilator is an underground duct leading out for some distance and opening into the atmosphere some six or eight feet above the ground. This should have a wide mouth, which, by a wing, is kept facing the wind. A basement curing-room should have a cement floor.

## PRESENTATION OF GOLD MEDALS.

At this juncture in the programme four beautiful gold medals, given as premiums in butter classes at the Toronto Industrial and London Western exhibitions by the Windsor Salt Co., were presented to the successful competitors or their representatives. Two were for exhibits of dairy butter and two for creamery, each having been salted with Windsor salt. The winners in the dairy classes were Mrs. Marion Burk, Bowmanville, and Mr. Albert Orchard, Sea-grave, the latter a graduate of Guelph Dairy School. The medal for the creamery exhibit at London was won by R. P. Bearmon, Desboro, while the Toronto creamery medal was not presented owing to a misunderstanding as to its rightful ownership.

## THE SECRETION OF MILK.

Prof. H. H. Dean, Guelph Dairy School, in an address stated that milk is partly filtered from the blood, and is formed partly by the breaking down of cells in the udder while the milking is in progress. Milk is largely made while the milking is in progress, as the most ever found in the udder of a slaughtered cow was four quarts. The more at ease a cow remains while being milked the more she will give. The yellow color of milk is due to a substance called lactochrome, which some cows and breeds of cows have a special power to secrete. The Professor hopes to see the time when no coloring matter will be used in cheese or butter making, as it is of no value and is added only to deceive the consumer. Cows give more milk and more fat if milked three or four times a day than if milked twice, for the reason that the process of milking stimulates secretion. In milking, the first few streams should be thrown away, as it has very little fat and contains bacteria which have worked up the teat duct. To keep cows clean the hind quarters should be clipped with horse clippers in the fall and the long hairs of the udder should be trimmed off. Many valuable suggestions were thrown out in the course of the address.

## PURE WATER SUPPLY

was the subject of an address by Prof. Shutt, Central Experimental Farm Chemist. Over 50 percent. of the samples of well water sent him for examination he found badly contaminated. Natural streams, lakes, etc., are practically free from organic contamination, but many wells are dangerous to their users. Too often a well is put down where most convenient, near a barnyard or other objectionable situation without making provision for proper drainage. Leaching from privy sinks or barnyard into water causes poisoning of the system and disease in those using the water, be they lower or higher animals. Typhoid fever, diphtheria, indigestion, diarrhoea, sick headache, etc., are frequently due to this cause. Cool, clear, sparkling water is not necessarily pure. In locating a well in lightest soil its distance from any source of contamination should be at least ten times as far away as the well is deep. In heavy, tenacious clay a less distance will answer, but in either case the slope of the surface and under strata should govern the location of the well.

## SUMMER AND WINTER CREAMERY BUTTERMILKING

was talked of by H. B. Gurler, De Kalb, Ill. This address was largely a review of difficulties met with, especially in the commencement of creamery practice. In his own experience Mr. Gurler found the transition stage between cheese and butter making the most trying. In summer the conditions for making good butter are favorable, except in extremely hot weather. The food is suitable, the water is usually good, and as the cows are usually outside, the air is pure. Instances were cited which had caused much loss by bad flavors in butter, as a dead carcass near the pasture, or the herd having to pass a dead skunk each day. When trouble from such a cause is encountered the guilty patron can be traced by heating a sample of each patron's milk separately up to 130 degrees, when it will give off the odors contained. When the trouble has in this way been traced to the patron he can investigate till the source is arrived at. In winter decayed ensilage may cause trouble, and may be due to leaving too much silo surface exposed. Moldy chop fed will give trouble to the buttermaker. The speaker stated that the best flavored butter is often made from good ensilage. His Chicago invalid milk trade is supplied from cows fed on ensilage. Tallowy butter and long churning are usually due to strippers. Mr. Gurler's long churning practice as reviewed differs little from that followed in Canadian creameries. He recommended the use of the tablet acid test, and that a fresh starter be made every day.

A discussion upon this address brought out the following pointers: Cream, after separation, should be quickly cooled to 55 degrees in order to harden the fat. It should be ripened at 68 to 70 degrees and cooled down again several hours before churning. Rich cream enables a low churning temperature and more exhaustive churning. The butter is better worked twice.

## COLD STORAGE.

Prof. J. W. Robertson showed clearly the need of proper cold storage at the farm, the factory and from the factory to the British market. The British people will not buy deteriorated food products. They are very discriminating. The poor people of England are being better fed now than ever before because of the enormous amount of second grade food products going to that market. We can get good prices only by improved preserving facilities. An ideal

system was outlined, much the same as we have frequently given in our columns. Reports from creameries using Prof. Robertson's cold storage system prove its excellence. Full instructions and plans of constructing cold storage at creameries and cheese factories will be sent to any who apply to the Agricultural Department at Ottawa.

## BUTTERMILKING

was discussed by J. A. Ruddick, of Kingston Dairy School. Butter to be first-class must score high in flavor, body or grain, color, salt, and finish. These are of importance in the order named. Flavor is influenced by the health and surroundings of the cow, quality and condition of the food, period of lactation and the care of the milk and the process of making the butter. The body or grain of the butter is influenced largely by the temperatures of the cream before churning, during churning and the working, packing, etc. The flavor from pasteurized cream is largely governed by the flavor of the starter used. Mr. Ruddick highly recommended pasteurization in winter creameries. If the cream is held at 140 degrees for thirty minutes good results may be obtained, but it should be cooled below 50 degrees as soon as possible afterwards. The practice of pasteurization and the use of starters should be entered upon with care, as experience is the best teacher. To get a desirable body to butter the wash water should be about 50 or 52 degrees, so that the grains will adhere readily and not be too soft. If butter is too hard the worker will crush the grain, and if too soft it will become greasy. Marbled butter is due to uneven salting; at eaked butter has been worked too cold, and specked butter contains specks of curds, due to overripening the cream. For local trade little working is necessary, but for the English market twice working is necessary to secure uniformity and firmness. It should drip well before first working and stand four or five hours before second working, which should be done at 50 degrees. It should be worked till it will bend a little more than half over before it breaks.

## UNIMPROVED OPPORTUNITIES IN DAIRYING

was the subject of H. B. Gurler's second address. Our dairy herds are the foundation of our business, and in these there is great room for improvement. Some herds average 400 lbs. of butter per cow annually, others 300 lbs., and many others much less. Two hundred pounds per cow was claimed as necessary to make her owner a profit. Why do men keep unprofitable cows? The scale and Babcock test will easily find them. When Mr. Gurler first tested his herd in the old way, with the churn, his cows were each giving 150 lbs. per year. In two years he had raised their average to 266 lbs., and in 1897 his cows over four years average 329 lbs. of butter for the year. Heifers should calve at two years old, and only good bulls should be used. The food, feeding and care were all elaborated upon. A quarterly return is secured from a fall calving cow, besides a better raised calf.

## GOOD ROADS

were recommended and described by Commissioner A. W. Campbell, C. E. After pointing out the importance of good roads to the dairy industry by cheapening haulage, it was shown how much better roads can be made at less cost than the present system of statute labor under local pathmasters involves. On an average the cost of milk haulage is 1 1/2 cents per cwt., and for manufacture 2 cent per cwt. of milk. By the present system 100 pathmasters will make about 100 sorts of roads, and each year undo last year's work. Some want one width, some another, some one slope and some a different angle. The lazy sections demand money from the different angle. The lazy sections demand money from the different angle. The lazy sections demand money from the different angle. By council to get as good roads as the working sections. By the present unsatisfactory system 1,000,000 days are spent annually, besides \$3,500,000, and little is accomplished. This in ten years would macadamize all the roads in Ontario if properly directed. Mr. Campbell recommended that beats be made at least five miles long and be overseen by a competent road builder. Drainage is most important beneath the center and on either side. It should be graded one inch to the foot from the crown to the ditches. The roadbed should be rolled very hard with a nine-ton roller. The top of roadbed should be slightly scooped out and clean gravel or crushed stone should be put on and rolled perfectly firm. The ditches should be 24 feet apart, and the gravelled roadbed 8 feet wide and 10 inches deep. A case was instanced in Eastern Ontario where by properly directed statute labor 1 1/2 miles of permanent road, such as the above, was built, costing the council not more than \$75. This was done by willing workers properly directed. The same people did five miles in two years in the same manner.

## DAIRY LEGISLATION.

Prof. J. W. Robertson, after reviewing the various acts that have been passed regarding the dairy industry, pointed out the advantages that would result from the passage of the bill introduced into Parliament last year by Mr. Parnell to prevent the selling of cheese for future delivery. Its function is to prevent speculation in cheese before it is manufactured. When a speculator contracts in June to deliver September cheese at a certain price his efforts will be from that date to bear down the market price, but when a dealer holds cheese already made for a rise his effort will be to raise the market value, hence the advantage of the bill to sort of speculation over the former. The bill as introduced does not prevent a factory-man representing a certain number of patrons owning cows to contract his season's make, but simply to prevent the middleman, who never owns anything, from gambling a living out of the business to the loss of the dairy producers.

The address led to a lively discussion, mostly in favor of the bill, there being just two cheese buyers opposing it. The following day, however, the committee on resolutions recommended that in the opinion of the meeting the law referred to should not be enacted until such time as the dairymen's boards of trade in Canada shall have had ample opportunity for considering and expressing their views upon the same. The motion slid through without discussion and a very slim show of hands.

Officers elected: President, Harold Eagle, Attercliffe Station; 1st Vice-President, R. M. Ballantyne, Stratford;

2nd Vice-President, Aaron Wenger, Ayton; 3rd Vice-President, James Connolly, Porter Hill. Directors—J. N. Paget, Canboro; Andrew Pattullo, Woodstock; Geo. Barr, Sebringville; J. A. James, Niles-town; Robert Johnston, Bright. Auditors—J. A. Nelles, London; J. C. Hegler, Ingersoll.

Representatives to fair boards—Toronto, Harold Eagle; London, J. S. Pearce and R. Robertson; Fat Stock Dairy Show, R. M. Ballantyne and J. N. Paget.

## Bad Flavor in Cheese Caused by Undesirable Bacteria in Water Used in Factory.

BY F. C. HARRISON, BACTERIOLOGIST ONTARIO AGRICULTURAL COLLEGE.

During the past two years I have made a large number of analyses of Canadian Cheddar cheese, and one of the samples sent this year by Mr. Publow, Instructor in Cheesemaking for Eastern Ontario, had very bad flavor. Mr. Publow, writing to me on August 1st, 1897, says: "I send you by this mail a sample of cheese from the Ashton Union Factory. I find all their cheese has a bad flavor, and in testing the milk it all appeared to be of very good flavor. The cheesemaker is a good maker, and has his factory in first-class condition. Everything is very clean, but the water he is using stinks, and I think is the cause of the bad flavor. I am having them send you a bottle of water."

Later, I received more cheese, together with Mr. Publow's report on the factory, which reads as follows: "Factory visited on July 31st, 1897. The condition of the factory, milk vats, presses, sinks and utensils was clean and in good condition. The making-room's appearance and condition was clean and tidy. The curing-room's appearance and condition was clean and tidy; the drainage good. General appearance first-class."

Report on the cheese: "Number of cheese made each day—Ten. Flavor—Not clean, off flavor. Body—Close and firm. Texture—Fine. Color—Bright and uniform. Appearance and finish—Neat, well finished. Remarks and recommendations—The cheese are well made and have a fine appearance, but off flavor."

The water from the Ashton Union Factory was received in a large Winchester bottle, in good condition, but it was not packed in ice; and as a considerable interval had elapsed between the collection of the sample and its examination, the number of bacteria present when collected must have undergone extensive multiplication. For example, Kruger found that the bacteria in samples of water examined by him and kept for twenty hours at 52 degrees Fahrenheit, increased 5.3 times. This fact may account in part for the very large number of germs present in the sample sent from the Ashton factory, viz., an average of 271,000 per cubic centimeter (about twenty drops).

There were five different species of germs present; each was grown in pure culture, and sterilized milk was inoculated with each species. The chemical analysis of the water showed that it was below second-class, and consequently should be regarded as suspicious.

The bacteriological analysis of the cheese was as follows: Average total number of germs, 11,404,900 per gram (1.25th of an ounce); species present, 4; percentage of lactic acid germs present, 94; percentage of other germs present, 6.

The germs isolated from the milk and cheese were compared, and two of the species found in the water were discovered to be identical with two of the species in the cheese. One kind was, however, in such small numbers in the cheese that its presence was disregarded altogether; and the biological characters of the remaining germ were carefully studied, in order to be sure that the species found in the water and that found in the cheese were identical.

A starter made from a culture of this germ in milk (pasteurized for twenty minutes on two consecutive days) was used in a vat of milk for making cheese at the College dairy on August 18th. The following are the particulars of making, as reported by Mr. Stratton, the College cheesemaker:

Pounds of milk	200.
Condition of milk	Normal, good.
Per cent. of fat in milk	3.2.
Amount of coloring used	2 drams.
Rennet test for ripeness	22 seconds.
Temperature set	88° F.—2° higher than usual.
Time set	11:55 a. m.
Amount of rennet used	34 oz. per 1,000 lbs. of milk.
Time out	12:28 p. m.
Minutes in curdling	33 minutes.
Temperature for cooking	95°.
Hot iron test when dipped	No acid; acid whey, .196%.
Time dipped	3 p. m.
Time from setting to dipping	3 hours 5 minutes.
Per cent. of fat in whey	.35%.
Hot iron test when milked	No acid; per cent. acid, .333.
Time milked	5:10 p. m.
Time salted	6 a. m., August 14th.
Hours from dipping to salting	15 hours.
Amount of salt used	24 lbs. per 100 lbs. curd.
Temperature when put to press	83° Fahrenheit.
Weight of green cheese	18 25 lbs.
Weight of cured cheese	17 lbs.

Remarks.—Milk was about three hours ripening from time of adding starter. The flavor was rank; curd the same. Have had lots of curds with more gas; but this one was so harsh and stiff at 8:30 p. m. that I decided to leave it over night before salting. Left hot water in vat and covered well. In the morning, water was at 96 degrees; curd, 85 degrees; more gassy than on the night before. Milled at 5:15 a. m. and aired until salted. It was so dry that no drippings would run from it after