

times a cheese appears to be very moist, yet, on analysis, it may be about normal, or under average in moisture content. Determination of the soluble caseous matter generally shows such a cheese to be high in this respect, and what was thought to be moisture is really a breaking-down of the nitrogenous or muscle-forming part of the cheese. We frequently meet with such cheese where an extra amount of rennet is used, indicating that rennet is an active agent in the ripening of cheese; in fact, is probably the chief cause of the change known as "curing" or ripening.

In most cases, however, dry or soft cheese are caused by the absence or presence of moisture, though in some cases it may be due to an incorrect proportion of fat.

As the presence or absence of water, containing in solution valuable food constituents, like milk, sugar, ash or mineral matter, albumen, and some casein, is the most common cause of the phenomenon under consideration, we may briefly look at the conditions which determine the amount of moisture held in curd and cheese under normal conditions.

First, is the proportion and character of the casein, which is acted upon by the rennet, and becomes the carrier and holder of all other milk constituents found in the cheese. Some milks appear to have curd better adapted for holding and carrying than others. Milk properly cared for in the way of cooling seems to have this property in a greater degree. Our investigational work during the past season (1908) would lead us to believe that at certain times the milk is deficient in its normal proportion of casein, consequently the average from such milk is high—i. e., it takes more pounds of milk to make a pound of cheese.

Lactic acid seems to play an important part with reference to the amount of moisture held by the curds and cheese. The tendency is for cheese made from "fast-working" milk to be dry and crumbly in texture. The development of too much lactic acid causes undue and rapid contraction of the particles of curd, causing an excessive expulsion of the water in the cube of the curd. To counteract this tendency, cheesemakers resort to various means for checking the acid, such as rapid heating, early removal of the whey, washing the curds, cooking to a higher temperature than usual, etc. Proper control of the lactic acid is a very important point in making fine cheddar cheese. For this purpose, we know of nothing so useful as the acidimeter, along with good sense. A third cause of dry cheese is the constant stirring of the curds which is practiced by most Canadian cheesemakers. We are well aware that on this point we differ with a number of good men and practical cheesemakers whose opinion we are bound to respect, because they have "made good" in their practical work, but we may be allowed to say that, in our judgment, much needless energy, perspiration and cheesemaking material are annually wasted in stirring curds.

HOME CONSUMPTION OF CHEESE NOT KNOWN.

So far as we know, there are no statistics available showing how much cheese is sold in our local markets, but all are agreed that the present consumption could be materially increased if the right kind of cheese were offered. This was the unanimous opinion of the Manufacturers' Association on a recent visit to the Ontario Agricultural College. All agreed that if they could buy cheese like the sample supplied to the visitors at the Dairy Department, they would purchase much more. One man said he was coming back for a whole cheese, if it could be got. This is cited as an illustration of what might be done by supplying the right kind of cheese—not culls—for local trade.

H. H. D.

METHOD OF PASTEURIZING WHEY.

Editorials and correspondence dealing with whey pasteurization, appearing in the columns of "The Farmer's Advocate" during the past few weeks, have elicited from some cheesemakers a request that we give concise directions as to the most approved method of doing the work. The method will have to be regulated by conditions in the factory. Pipe connections between boiler and whey tank are necessary. Any device whereby steam can be directed into the tank will answer the purpose. Of course, a thorough distribution of the steam in the whey is essential to thorough and regular heating. Some makers find it economical to utilize the exhaust steam for most of the heating. Again, the use that can be made of the exhaust steam depends on the situation and equipment in the factory. All that is necessary is to have the temperature of the whey raised to 150 or 155 degrees, so as to prevent the formation of high acid, and also to inhibit the growth of bacteria which may be present in the whey. Higher temperature than 155 degrees is injurious. When acid developed to 1.5 or 2.0 per cent. in whey not heated, that which had been heated to 150 or 155 degrees showed only .25 per cent. acid. Another important factor is the daily

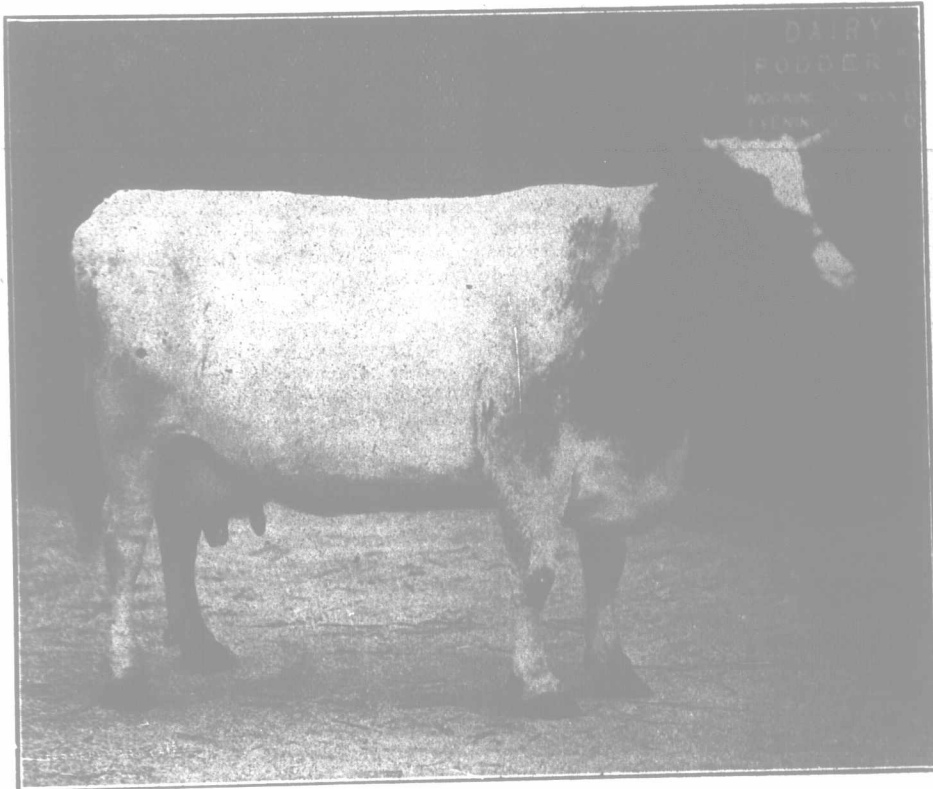
emptying of the whey tanks, and strict cleanliness. It has been suggested that lack of thoroughness in the heating might result in more harm than good. The season's work shows that heating to any temperature below 155 degrees is attended by no injury.

DAIRY PROBLEMS DISCUSSED AT SIMCOE.

The thoroughness with which dairy interests are supported by the present system of instruction and dairy education in Ontario, was evidenced at a district meeting at Simcoe, Ont., on November 24th, which a representative of "The Farmer's Advocate" was privileged to attend. In addition to a most interesting summing up of Canadian cheese manufacture in the various Provinces, there were discussions on problems old and new, which showed the intelligent interest taken in the work. The only regrettable feature of the meeting was the fact that every maker and every patron within a radius of eight or ten miles did not cast other cares aside for a single afternoon and partake of a real treat.

The chair was occupied by J. J. Parsons, of Jarvis, a director of the Western Ontario Dairy-men's Association. In opening the meeting, he pointed out the importance of holding such meetings, and asked all to take part in the discussions.

In dealing with the output of cheese in the various Provinces of Canada, Frank Hens, of London, Chief Dairy Instructor, said that Canadian cheese factories in 1907 manufactured 102,394 tons. Of this total, Ontario factories turned



Minnie.

Unregistered Shorthorn cow. First by inspection, highly commended in milking trial, London Dairy Show, 1908. Milk yield, one day, 60 lbs. 15 oz.; butter, 2 lbs. 4 ozs.

out 64,846 tons. Western Ontario made 16,827 tons, or one-third of the total output of Ontario. Eastern Ontario made 48,019 tons. Western Ontario, therefore, turned out only about one-sixth of the total quantity of cheese produced in Canada. The greater or less output of cheese from Western Ontario, caused by climatic conditions, therefore, does not affect the world's cheese market as much, probably, as some have been led to suppose, not being acquainted with the facts. Quebec made 34,943 tons, Manitoba 633 tons, New Brunswick 602 tons, Nova Scotia 99 tons, Alberta 99 tons, and British Columbia 45 tons. The manufacture of dairy products during recent years indicated that Western Canada, as well as the Maritime Provinces, were directing their energies to buttermaking, rather than to the manufacture of cheese.

The organization in Western Ontario showed 200 factories in six groups, and seven factories in addition in the Orangeville district. The 200 factories had 16,295 patrons, whereas 73 creameries had 14,147 patrons. The average was 81 patrons to a factory, and an output of 83 tons of cheese to the factory, or 1.02 tons to the patron.

AVERAGE PER CENT. OF FAT IN MILK.

Throughout the season of 1908 attempts had been made to secure accurate data regarding the per cent. of fat in milk. The average was as follows: May, 3.3 per cent.; June, 3.37 per cent.; July, 3.38 per cent.; August, 3.5 per cent.; September, 3.65 per cent.; October, 3.8 per cent. For the season, the average was 3.5 per cent.

LOSS OF FAT IN WHEY.

Further interesting figures were given, showing the loss of fat in whey. In the past, various guesses had been made, but the results of between five and six hundred tests, from every factory in Western Ontario, covering every month from April to October, gave an average loss for the season of .23 per cent. fat. By the month, it was: May, .226 per cent.; June, .223 per cent.; July, .226 per cent.; August, .236 per cent.; September, .23 per cent.; October, .241 per cent. The results would lead one to believe that the yield of cheese in different months was not affected by loss of fat in whey during the cutting and cooking process, as much as by improper manipulations of the curd later, and by improper conditions of the milk.

PASTEURIZATION OF WHEY.

Satisfactory results had been derived from the heating or pasteurization of whey. Of 56 factories where pasteurizing had been practiced, the whey went home sweet and clean from 38. Judging from tests made, proper pasteurizing had not been done at the remaining 18 factories. As regards the economic side of whey pasteurization, Mr. Hens said that, in whey that had not been heated, the average per cent. of fat reaching the patron was about .09 per cent. In pasteurized whey the fat remained evenly distributed, and the average in that returned to the patron was about .23 per cent. No person seemed to have ascertained the true feeding value of fat left in the whey from the cheese factory, but a calculation at 4 cents per pound of fat showed a value of approximately

\$1.80 per ton of cheese, provided that the whey was properly pasteurized, and assuming that .23 per cent. fat was returned. Where not pasteurized, and whey returned under ordinary conditions, assuming .09 per cent. fat returned, the value would be only 72 cents per ton of cheese. It might be worth less or more. As regards the comparative values of pasteurized and unpasteurized whey, he could judge only from what the makers and men who fed it had to say. The general opinion was that pasteurizing made the whey more desirable for feeding. It was certain that the whey was kept sweet by the heating. According to reports from the season's work, it would pay patrons to arrange with the makers to pasteurize the whey before returning it.

The cost might range from 50c. to \$1 per ton of cheese, depending on the conditions under which the work had to be done.

CONDITION OF WHEY TANKS.

Frequent inspection revealed the fact that 59 whey tanks were cleaned once a week, and kept in satisfactory condition. Sixty-eight were cleaned every two weeks, and were in a fair state of cleanliness. Others were cleaned once a month. Experience had shown that the quality of the milk was injured by sour or unclean whey being in the cans. Why, therefore, could not makers and patrons arrange to keep the whey tanks in proper condition?

Mr. Parsons.—I know of factories where it is impossible to take time to clean the whey tanks. The fact is, whey is ready for the tank before the tank is empty.

Mr. Hens.—Something should be done to provide for such cases. It may require a small extra tank. There were eleven factories at which the whey tanks were not cleaned from spring to fall. Strange to say, eight of these are in one section. Some of the eleven factorymen contend that if they clean the tanks they will have bitter flavors. This argument will not hold good. It has been proven, too, that pasteurizing does away with bitter flavor.

Mr. Parsons stated that he was planning to put in two tanks, to be used day about, and the empty one cleaned thoroughly each alternate day. He believed pasteurizing the whey would do as much to improve the quality of cheese as cooling. Regarding the latter, reports from the Old Country showed that cheese put in cool-curing