

THE DAIRY.

Casien and Fat Content of Milk at Ontario Cheeseries, 1911 and 1912.

Prof. H. H. Dean discussing casien and fat in milk at Ontario cheeseries laid particular stress upon casien and the great need of knowing more about the composition of milk and dairy products in Canada. He said in part:

We know comparatively nothing regarding the composition of milk, which is the basis of intelligent improvement in the future. From the small amount of work done during the past two seasons, we are led to believe there is a marked variation in the composition of milk as delivered at Ontario cheese factories, so far as casien and fat are concerned. Who knows how much albumen, ash, sugar and water there is in Ontario milk, and what part these play in the manufacture of cheese and other dairy products?

For a long time, scientists, as well as practical men who had studied the question, thought it was necessary to consider milk-fat only when discussing the relation of milk constituents to cheese manufacture. The danger now is of considering casien only. After a careful study of this question during the past five years, I have come to the conclusion that it is practically impossible to consider either one of these alone, in its relation to cheese-making. It is possible that other milk constituents may also play an important part, but it is certain that these two, casien and fat, are the principal milk constituents concerned in the making of Canadian cheddar cheese. While we have been taught that each increase of a fraction of a per cent. of fat in the milk, means an increase of so much in the yield of cheese (some have been bold enough to say an increase also in the food value of the cheese), and now we are told that there is a relation between casien content and cheese, I make bold to say that the foregoing are impossibilities, strictly speaking. These two, casien and milk-fat, must be considered together. Without casien and milk-fat it is impossible to make good Canadian cheddar cheese. So far as the work at Guelph has gone, it indicates that there is no absolutely definite relation of casien to milk-fat required in normal milk, in order to give the best results in quality of cheese, although future investigations may cause a modification of this statement.

Prof. Dean referred briefly to the work done at the O. A. College, Guelph, on this question.

The tests for casien and fat of the vats of milk used in cheese-making during the five years, 1908 to 1912 inclusive, averaged as follows:

	Average Per Cent.	
	Casien	Fat.
1908	2.39	3.67
1909	2.50	3.60
1910	2.46	3.60
1911	2.30	3.58
1912	2.17	3.56

The tendency is towards lower average percentages of casien and fat in the milk that has been delivered at Guelph during the past five seasons from practically the same patrons each year. By months, we find the lowest average percentages for casien and fat usually in July and August and the highest in September and October, the latter probably due to advanced lactation among some cows.

During these five years one experiment was made each week during the cheese season of May to October, by dividing the milk of the patrons into two lots. Milk testing comparatively high in casien and fat was put in one vat, and milk with lower casien and fat content was put in another vat. The results of these five years' tests, consisting of 79 experiments in which over 82,000 lbs. milk were used, is as follows:

A. LOTS—LOW CASEIN AND FAT.

Year	Av. % fat in milk	Av. % casien in milk	Av. lbs. cheese per 1,000 lbs. milk	Av. lbs. cheese per		Av. % moisture in cheese one month old	Av. score. Max. 100.
				Lb. fat in milk	Lb. casien		
1908	3.51	2.32	88.40	2.51	3.85	35.40	91.90
1909	3.53	2.34	90.32	2.56	3.86	35.04	90.86
1910	3.53	2.44	92.70	2.62	3.79	35.30	90.13
1911	3.47	2.23	90.91	2.62	4.07	35.29	91.25
1912	3.42	2.08	90.70	2.64	4.33	34.50	92.09
Av. five years	3.49	2.28	90.60	2.59	3.98	34.90	91.24

B. LOTS—HIGH CASEIN AND FAT.

Year	Av. % fat in milk	Av. % casien in milk	Av. lbs. cheese per 1,000 lbs. milk	Lb. fat in milk	Lb. casien	Av. % moisture in cheese one month old	Av. score. Max. 100.
1908	3.75	2.46	94.50	2.52	3.84	34.4	91.70
1909	3.70	2.49	93.90	2.56	3.77	34.8	91.03
1910	3.86	2.65	97.34	2.50	3.68	35.1	91.18
1911	3.71	2.43	97.31	2.60	3.96	35.3	92.51
1912	3.84	2.36	96.23	2.50	4.02	34.5	92.97
Av. five years	3.77	2.48	95.85	2.53	3.85	34.8	91.87

These results show an average increase of 5½ lbs. cheese per 1,000 lbs. milk, where the average fat and casien contents of the milk were increased .28 and .2, respectively. We thus see that a very slight increase in the percentage of fat and casien in the milk from which cheese are made has quite a marked effect on the yield of cheese. The average for the five years' experiments is 10½ lbs. more cheese per ton of milk, worth at least one dollar to the patron or producer of such milk. The average yields of cheese, per pound of fat and per pound of casien in the milks are slightly higher from the lower fat and casien lots. The average percentages of moisture in the cheese, one month old, were 34.9 and 34.8—very little difference. The fat in the cheese was determined for the years 1911 and 1912. The cheese from the lower casien and fat lots averaged 35.58, while those from the higher casien-fat lots averaged 36.3 per cent. fat. The average scores of the cheese were 91.24 and 91.87 out of 100 respectively, for the two—low and high casien-fat lots. The average pounds of cheese made per pound of casien-fat in the milk from the lower testing lots was, 1.57; from the higher testing lots, 1.53.

To supplement the college work experiments were carried on at several factories, a composite test having been made of about ten patrons' milks at each factory for fat and casien, and as many

for the factories visited in Western Ontario, and 3.50 for Eastern Ontario, averaging 3.49 in both for the two years.

The striking points about these results are the comparatively wide variations in the percentages of casien and fat found in the different patrons' milk at these factories, and the closeness of the averages for both years are in both groups.

These results are based on tests of nearly 500 patrons' milk in each of the years 1911 and 1912, and represent about 8,000 tests in 1911 and 7,000 in 1912; a total of about 15,000 tests for casien and 15,000 for fat in the two years, a total of 30,000 tests altogether.

In order to obtain some data on the relation of casien and fat in vats of milk at these factories and the actual yield of cheese in 1912, a number of tests were made and the weight of green cheese as often as possible obtained. It was found difficult to obtain the weights of cheese exactly, as some curd would be left over from a vat or vats, but fourteen tests were fairly satisfactory. The weights of milk in the vats of these tests varied from about 4,000 lbs. to 22,500 lbs. The percentages of fat in the milk of these vats ranged from 3.4 to 3.7; the percentages of casien from 1.9 to 2.4. The weights of green cheese in one lot varied from 345½ lbs. to 2,024½ lbs. The range in pounds of cheese made per pound of fat-casien, was 1.44 to 1.67 and averaged 1.59. This figure is a little higher than that got at the O. A. C., where the average was 1.55, but the O. A. C. results are based on weights of cheese one month old, whereas the foregoing factory average is based on weights of green cheese, and we should expect a high number in that case.

Testing milk for casien and fat at cheese factories in both Eastern and Western Ontario shows a marked variation in the casien-fat content of Ontario cheese factory milks, which fact points to the importance of paying for milk at cheeseries according to its cheese-making value, which value is largely determined by the casien-fat content of the milk.

Until a practicable casien-fat test is evolved, we may test for milk-fat and casien separately by the Babcock and Hart or Walker methods, or adopt the plan of "Fat plus 2," which is near enough for all practical purposes, with normal milks.

POULTRY.

How to Fill the Egg Basket.

Keep the hens warm, the hen-house well ventilated, and as bright and sunny as possible. Provide a dust bath, using dry road dust, wood or screened coal ashes.

Keep the hoppers full of oyster-shell, ground bone and charcoal.

A constant supply of pure water is most important.

Have a rack filled with clover to supply the necessary green food.

Feed "meat scraps" in mash, three times a week, during cold weather, in proportion of 2 lbs. to every thirty-five hens. Feed a variety of grain and make them scratch for all they get.

RATIONS.

Dry mash for laying hens.—Feed daily in small quantity.

- 1 part bran.
- 1 " ground oats.
- 1 " cornmeal.
- 1 " shorts.
- 1 " crushed barley.

Mix.

MASH 2.

Table scraps, kitchen waste, small vegetables, porridge, vegetable parings, left over skim-milk or buttermilk. Mix with ground grains, in proportion of one-half waste to one-half ground grains. Feed warm three times a week, in quantity of two lbs. to 15 hens.

SCRATCHING FEED.

The combination of 30 lbs. of oats, 10 lbs. of wheat, 10 lbs. of barley, and 15 lbs. of buckwheat will give a large number of eggs of finest flavor, bringing two cents a dozen over market "ONE WHO KNOWS."

It is based on a practical experience with poul-

BUSH FOR SHELTER



Plan of a Fox Ranch.

Within the guard fence is a 40-foot belt of bush.

vats of milk as possible tested, and the weight of cheese made from these vats wherever practicable secured.

Six factories were visited in Western Ont. in each of the two years, and four in Eastern Ont. in 1911, and 6 in 1912.

The highest, lowest and average percentages of casien and fat in the milk of these two groups, for the two years are as follows:

W. Ont.	Per Cent. Casien			Per Cent. Fat		
	High.	Low.	Ave.	High.	Low.	Ave.
1911.....	2.90	1.6	2.26	4.5	2.7	3.42
1912.....	3.10	1.6	2.21	5.8	2.1	3.54
E. Ont.						
1911.....	2.70	1.6	2.35	4.3	2.6	3.50
1912.....	2.60	1.6	2.08	5.3	2.7	3.50
Av. two seasons.			2.22			3.49

The average percentage of casien in Western Ontario milks, as determined at the factories visited, was 2.23; for Eastern Ontario factories, 2.21; and for all the factories visited in the two years, 2.22. The milk-fat averages are: 3.48