

The Dairy.

Methods of Testing Milk and Cream.

[A Lecture delivered by W. A. Macdonald before the Dominion Farmers' Council.]
No. 1.

Shortly after the organization of this Council, a discussion arose amongst its members inquiring into the best methods of spending its special funds in the interests of agriculture. It was finally resolved that our dairying interests should receive our first attention, it being found that no simple, cheap and reliable method for testing milk and cream was within the reach of our farmers and dairymen, and that the reliance was based almost exclusively upon pedigree. This inadequate conception of merit led to many abuses which you resolved upon rectifying. After examining the various methods adopted by the leading dairy countries in the world, you invested \$30 in instruments ordered directly from the manufacturers in Germany, and then you appointed me to examine into and report upon the various methods which brought them into use. You afterwards brought up the question before the first annual meeting of the Ontario Creameries Association, the result being that a committee consisting of Prof. Robertson, Mr. Valancey E. Fuller and myself, was appointed to examine the various methods of testing. That committee has not yet met, owing to the prolonged absence of Prof. Robertson at the Colonial and Indian Exhibition. Meanwhile, I have been preparing my report, and as the dairy season is fast approaching, preparatory calculations should now be made.

There is another important reason why this question should now be fully discussed. A committee of your Council has just reported favorably upon the establishment of a register for dairy stock based upon individual merit, and this register cannot exist without some simple and fairly accurate mode of testing. Before such a herd-book can be firmly established, many erroneous impressions must be removed, which, at the outset, will make your progress slow. By common acceptance, cows are divided into milk, butter and cheese breeds or classes. Under the scrutiny of tests there is only the shadow of a cause for any distinction whatever. Cows that give a large quantity of watered milk possess no merits over those which give a smaller quantity of rich milk. With reference to butter-making, however, this distinction may exist, that a larger percentage of the butter-fat of one cow's milk, under similar conditions, may be converted into butter than that of another cow. But it is questionable that this distinction is so great as to necessitate classification.

In the question of testing milk and cream, a great deal of misapprehension exists. One dairyman uses the churn to test the actual butter capacity of the cream; another uses the alcohol-ether test, which gives the percentage of fat in the cream, and not the percentage of butter. There is another system by which the percentage of fat in the milk is used as the standard of valuation. There arises another important question, viz., How far can the required tests be conducted on one system or principle? A given test may be perfectly suitable and sufficiently accurate for one purpose, but not for another. Where the tests are made say at agricultural exhibitions, where the number must necessarily be limited, greater accuracy is required than when

they are repeated weekly or monthly throughout the entire season, and instruments which may not be accurate enough for a few tests, may become the more suitable the oftener the tests are made; hence the questions of quickness and cheapness are material as well as that of accuracy. In the establishment of just standards suitable for our requirements, we can evade none of these questions, and if we can arrive at results which are an improvement on our existing systems, we shall not labor in vain.

The most practical question for solution appears to be the ascertaining of some relation between a given quantity of cream and the resulting product of butter, for the variation in the different qualities is so great that it is very unjust to divide the butter in proportion to the quantity of cream delivered at the creameries; but before this question is settled, it is necessary to know which is the more just standard, the percentage of butter-fat or the percentage of butter. There exists a much more constant relation between the butter-fat in the milk and the resulting product of butter than between the quantity of cream and the resulting butter. We may here discard all distinction between milk and cream, for cream is milk containing a large percentage of fat. This is amply proved by the fact that butter-milk has the same composition as skim-milk. When the whole milk is churned it may be regarded as cream. There is no greater necessity in making a distinction between milk and cream than there is in drawing a line between cream containing 40 percent of fat and that containing 70 percent, or between milk containing three percent of fat and that containing six percent. On a similar principle, it is presumable that skim milk may be submitted to the same system of testing as cream or whole milk; but this question I shall hereafter put to the test. These conclusions lead us, first of all, to a study of the characteristics of milk.

(TO BE CONTINUED.)

Butter-Making in Denmark.

The Danes being our chief competitor in the British markets, any information regarding their methods will be of interest to our butter-makers. We are now passing through the same stage which they passed through many years ago, and we ought to take lessons from their experience, at least so far as our conditions will permit. We do not contend that we should blindly follow their customs and their practices, but there are many things in their methods from which we should take useful hints. The Danish Government has spent vast sums of money in the encouragement of butter-making, but we, with the aid of recent investigations, do not require such expenditures. We take the following from a conference in the *Pall Mall Gazette* with Prof. Segelcke, of Copenhagen:

"I have been lecturer on dairy farming since 1860," said Professor Segelcke in answer to a question. "At that time everything was done in a very rough-and-ready fashion, and there was all the irregularity of quality that is so fatal to success in this industry, more perhaps than in any other. With a splendid climate and soil for the production of butter, still it was made badly and on wrong principles; it was sent to market in a way to spoil it, and everything was unsatisfactory. At that time I took up teaching in connection with the Royal Agricultural Society of Denmark, with a view to improve the whole system.

"At first I had to face very strong opposition, and it was a long time ere there was anything

like a general appreciation of our work, but in the course of a few years self-interest did what foresight failed to do. The vast improvement in the butter of those who accepted our help gave them higher prices, and the common law of everyday commercial life has been the means of effecting the great change in the butter history of Denmark. Now everyone strives to produce the best, and we have defended our customers by insisting upon good quality.

"Perhaps I should explain," continued the Professor, "the grades of our tuition. There are really four—namely, that of the dairymaids, the Hollander or stockmaster, the young farmers and the collegiate course—the last being really a continuation of the third. There is, in addition to these four, the tuition at the public schools.

1. "Under the old system, the dairymaids were supreme. Previous to the time of which I am speaking, it was customary for the wives and daughters of the farmers to take part in, if not actual charge of, the dairies; but that had been given up, and the dairymaids were supreme in all matters relating to the making of butter or the skim milk cheese, which is the kind chiefly made in Denmark. They would allow no interference whatever with their work, and as the farmers or stockmasters knew nothing of dairying, they were permitted to do just what they thought fit. Everything was done by guess; nothing by knowledge. Some there were who understood the necessity for cleanliness and exactness, and though they might not be aware why a thing ought to be done, having had no scientific teaching, yet they realised that it helped to attain success. They had pride in their work, and thus succeeded in what they did. This class was the first to be touched, and very hard work it was. They did not believe in new ways. The old had done very well for them, and could not be improved. But by patience the thing was done. A few here and there accepted help, and thus the ice was broken. The system of apprentices was made use of, and the Danish Royal Agricultural Society aided us by grants of money. These apprentices are taken for two years, and we give allowances to the chief dairymaids where they will accept our methods and teach the apprentices in the way desired by us. Now I could take you to hundreds of dairies throughout the country which are perfect in their arrangements, where every detail is carefully carried out, and the dairymaids know not only that to obtain good butter certain things have to be done, but why it is so. The result is that the butter of these dairies is of the highest quality, and maintains its character all the year round.

2. "Having captured the dairymaids, we next commenced operations with the stockmasters. Twenty-five years ago they gave themselves entirely to the care of the stock and of the farm, knowing nothing of dairy work. If they had interfered the dairymaids would have refused to continue, and thus they allowed things to go on. All they had to do was to make the firkins or casks (this is not done by them now) and attend to the sales. But we have altered all that. They are taught dairy work if they wish, of which opportunity very many have availed themselves, so that they are at all times able to judge whether things are being done rightly, and can take hold of the entire work if needs be. But we have done more. We have taught them the principles of breeding, and hope by this means to considerably improve the milking properties of the cattle.

3. "But when we came to the young men, sons of the farmers," said Professor Segelcke, "there was the greatest opposition of all. These also knew nothing of dairy work. I exposed the evil of this, showing that a field of labor was thus closed to them, and that it meant a perpetuation of the system whereby the farmers were entirely at the mercy of their dairymaids. This I pointed out could not be right, and it was important that the farmer should be able to overlook all the work upon his farm. Opposition, of course, came from the dairymaids themselves, who were fearful for their profession; and outsiders were afraid of the danger arising from the mixing of young men and women together. However, I induced two of my friends to take a couple of these young men for a course of training in the dairy. This experiment was a perfect success, no harm resulted from the mixing of the sexes, and