LOWLAND BREEDS.

Dutch	4,023
East Friesland	3,420
Oldenburger	3,192
Angler	3,460

OTHER PURE FOREIGN BREEDS.

Ayrshire	3,889
Yorkshire	3,530
Algauer	3,364
Norwegian Mountain	4,503

CROSS BREEDS.

Stromholms (Swedish), ½ Shorthorn, ½ Algauer	3,858
Herregards (Swedish), Yorkshire Shorthorns	3,423
Herregards (Swedish), Yorkshire Shorthorns, East Friesland	3,185
Herregards (different herds)	2,968
Dutch and Herregards	3,545
Swedish and Dutch	3,562
Swedish and East Friesland	3,350
Oldenburger and ½ Ayrshire	3,778
Ayrshire (different herds)	3,760
Ayrshire and Swedish	3,460
Ayrshire and Shorthorn	3,787
Katrineholm (Swedish) and Ayrshire	3,328
¾ Algauer	3,217
½ Algauer	3,882
Grades	3,464

Testing Milk and Cream.

[A Lecture delivered by W. A. Macdonald before the Dominion Farmers' Council.]

No. VI.—SOXHLET'S MILK-TESTER.

This instrument was invented by Dr. Soxhlet, a distinguished German investigator, in 1879, and is little known in Canada, although it is extensively used by dairymen in Europe. It works on a principle quite different from any of the other instruments which I have described. I shall not trouble you with figures comparing its accuracy with the results obtained by chemical analyses; but shall merely mention that, although it only costs $12 at the manufactory, the results correspond so closely to those obtained by chemical analysis that the instrument is all that can be desired for all practical purposes; the average differences are mere nothing, and the variations in individual cases are very insignificant. Any farmer or dairymen, after a little practice, can operate the instrument successfully. The butter fat in the milk is dissolved by ether and caustic potash, and then the percentage of fat in the milk can be read off in a graduated glass tube by taking the specific gravity of the ether-fat solution, which is the more concentrated the more fat the milk contains.

VII.—THE LACTOCRITE.

This instrument is quite a new invention, and tests the quality of the milk with the same accuracy as the apparatus which I have just described. It was invented by De Laval, but cannot be used except in connection with his separators. Twelve samples of milk can be tested at one operation, and 60 tests can be made in an hour. It does not require an expert to operate it. It makes more tests in a shorter time than Soxhlet's apparatus, but its cost is seven times greater. In this country it costs as much as the hand separator. In making the test, the milk is first boiled in acetic acid, which dissolves the casein—so curdled or sour milk can also be tested—the milk serum being thus transformed into a clear and thin fluid, the fat not being affected. The fat is gathered by revolving the milk in a De Laval separator, and the percentage is read off in a graduated glass tube. The results given by the lactocrite in testing skim or butter milk are about one-fifth percent too low, and the instrument is therefore inferior to Soxhlet's in these branches of testing.

VIII.—CORONANDER'S MILK TESTER.

This apparatus is a new German invention, and bears the name of the inventor. Small glass flasks, the number corresponding to the number of tests desired to be made at one operation, are required. The samples of milk to be tested are placed in these flasks, and a solution of caustic potash and ether is added. The flasks are then placed in a hot water bath, the temperature being kept regular, and after a short time the temperature is slightly raised to evaporate the ether, which holds the fat in solution. A cork is now provided in which two glass tubes perforate, one of which extends nearly to the bottom of the flask, and water is now poured into the flask until the butter fat, which swims on the surface of the liquid, reaches the null point in one of the glass tubes, which is so graduated that the percentage of fat in the milk can be read at a glance. The one cork, with the fitting glass tubes, is sufficient for all the flasks, and the determinations can be made as quickly as the operator passes from one bottle or flask to the other. This apparatus is sufficiently accurate for all practical purposes, being very nearly as accurate as Soxhlet's and the lactocrite. The cost is very little, say about five or six dollars, which will include flasks enough to make 60 analyses at once. It requires no expert to operate it, and it is the cheapest and most labor saving apparatus that has yet been invented. It will analyze milk, cream, skim-milk and butter-milk with the same accuracy and facility. It is adapted for creameries, cheese factories, for testing at exhibitions, and for all circumstances in which a large number of tests are required to be made at one operation.

I have now given you a short description of the most noteworthy instruments for testing the percentage of fat in milk and cream, and my task would now be ended if our dairymen adopted the same methods of thinking as those in Europe.

Our dairymen affect to be extremely practical; but there is scarcely a limit to the complications in their methods. Neither they nor our dairy professors seem to care about the percentage of fat in the milk or cream; what they want to get at is the butter capacity of the cream, which they regard as the plain, practical way of solving the question. They are even working blindly under this system, while the Europeans have solved and abandoned it. I must admit this, however, that our conditions at present are somewhat different, but their policy should be to make our conditions more akin to those on the continent of Europe.

If the butter capacity of the milk or cream can be shown to correspond with the chemical analysis, then it makes no difference whether you adopt the fat or the butter standard, provided (1) that the butter can be obtained with the same facility and at the same expense as the fat, and (2) that the same degree of justice can be meted out to the respective patrons of the creamery, and to the other parties concerned.

Last year about 160 tests were made at the New York experiment station, comparing the butter obtained with the chemical analysis of the milk. The Cherry Churn was used, the milk being set moderately deep about 54 hours in running water at a temperature varying from 40° to 50° Fahr. The conditions for cream rising were therefore rather more favorable than those obtained on the average farm. The cows were natives. The churns were stopped when the butter appeared in the granular form, and, being washed and weighed, the butter was allowed to stand 24 hours in a warm, dry place, after which it was weighed again, the percentages of butter being taken from the last weighings. I shall not trouble you to notice each test individually, but shall divide the tests into groups of about 20 individual tests in each group, the following being the average results:

	Percent of fat by Analysis.	Percent of butter from milk.		Percent of fat by Analysis.	Percent of butter from milk.
1	3.32	3.21	5	3.40	2.97
2	3.60	3.68	6	3.80	3.24
3	3.87	3.89	7	4.18	3.81
4	4.41	4.39	8	5.11	4.73

If you take the grand average of all these 160 tests, you will find that the percentage of fat obtained by chemical analysis is 3.96, while the average percentage of butter obtained from the milk is 3.74—a difference therefore of 0.22 percent in favor of the analysis, so that the percentage of butter would be obtained by multiplying the percentage of fat by 0.944. In some individual cases, there is a wide difference between the fat and the butter. In some instances the churning lasted several hours, and in others no butter could be obtained after a whole day's churning, although the milk showed high percentages of fat. These tests were made from milk and cream which were under the control of the experimenter. In actual practice, where some of the cream must necessarily be churned sweet, some sour, etc., etc., the variations are much greater—the sweeter the cream the greater the percentage of fat left in the butter-milk, varying from one-half to five or six percent. Besides all these irregularities, the labor and expense of churning are greater than many of the fat tests. The pertinent question now arises, which is the more correct and just standard, the percentage of fat or the percentage of butter? I have already pointed out the crying injustice of the standard adopted by many of our creamerymen, viz., the bulk of cream.

(To be continued.)

A report to the Michigan Horticultural Society says: Michigan apple growers are beginning to fight the codling moth with poisons successfully. Those of experience in the work say: Get only pure Paris green, then use three ounces to forty gallons of water. Apply just as soon as the trees are out in bloom, but avoid inhaling the spray, and handle the nozzle with gloves, lest the poison find some break in the skin of the hand. Wm. A. Brown, who made large exhibits at four great expositions, found his specimens almost exclusively in sprayed orchards.

It often happens, says the Farm and Garden, that we have varieties of apples that are tender and winter-kill. We wish to grow them, but are not able to do so on their own roots. We find there are varieties—like the Northern Spy and Golden Russet—that are usually very hardy. If we take the trees of those varieties, and a few others that are alike hardy, we may set grafts in them at the point where we wish to make the tree form its branches, and by this means we form a new top, of a variety that is not hardy on its own roots. This tree will be much hardier than by the usual plan. In Michigan, and certain sections of many Northern States, where the trunks of fruit trees are killed and split by cold winters, the plan we advise will prevent the usual winter-kill.