

2. A double set of cream bottles (4 dozen), a portion graduated to read 30 per cent. and a portion 40 per cent.

3. An 18 c.c. pipette. A pipette graduated to 17.6 c.c. for milk and 18 c.c. for cream is a convenience. The careful use of a sensitive scale, which will weigh grams, insures greater accuracy than measuring.

4. A supply of commercial sulphuric acid, which costs about 65c. per gallon, or about  $\frac{1}{4}$  cent per test, and suitable acid measures.

5. A wooden case or rack that will hold 24 cream bottles. It is well to have a separate space or opening for each bottle.

6. Sufficient pint or half-pint milk bottles to furnish a composite sample jar for each patron.

7. Gummed labels bearing the patron's name, or number, should be pasted on the necks of the jars and coated with white shellac. This will prevent the labels being washed off.

8. The sample jars should have sound corks. Turned wooden corks are very satisfactory.

9. A supply of preservative, in the form of tablets or powders, consisting of seven parts of potassium bichromate to one part of corrosive sublimate.

10. Dividers or compasses to measure the fat column.

The quantity of preservative required for each sample jar is about what will lie on a ten-cent piece. This should be placed in the composite jar before the addition of any cream.

The addition of each subsequent sample of cream should be followed by a rotary motion to thoroughly unite the fresh sample with the preservative.

Sample jars should be kept well corked, and preferably in a cool place.

A detailed outline of the Babcock test may be found in Bulletin 114, from the Ontario Agricultural College.

**OIL TESTS.**—The value of cream for buttermaking may be approximately estimated by means of the oil test, which is simply a churning process. The outlines of this method of testing are generally known, and call for only a passing reference.

The readiness with which a separation of the oil is effected from the serum is governed very largely by the degree of acid developed in the samples before the commencement of the churning process. This being true, it necessarily follows that ripe or sour samples of cream will give a higher or more satisfactory test than samples of fresh, sweet cream; thus, the oil-test may be said to place a premium on sour cream.

As the Babcock test is rapidly displacing the oil test in cream-gathering creameries, it may be well to become familiar with the relation between the readings of the two tests.

Viewing this relation from the theory of the oil test, we have somewhat as follows: A standard creamery inch is one inch of cream (in a pail 12 inches in diameter) testing 100. One inch, therefore, contains  $(12-2)2 \times 3.1416 \times 1$  equal to 113 cubic inches. One pound of butter contains about 25 cubic inches of butter oil, which is 22 per cent. of 113. Therefore, any sample of cream which will yield 22 per cent. of its volume in butter oil should read 100 and make a pound of butter per inch. A reading of 100 by the oil test would, therefore, theoretically, be equal to 22 per cent. of fat.

As viewed from the fat or Babcock test, we have the following: The overrun in cream-gathering creameries will probably range from 15 to 18 per cent. Then 100 pounds fat would yield 116.5 pounds butter.

One pound butter would require 100-116.5 pounds fat.

One inch of cream weighs 4.1 pounds.

Therefore, in order to yield one pound butter per inch:

4.1 lbs. cream must contain 100-116.5 lbs. fat.

1 lb. cream must contain  $100-116.5 \times 1-4.1$  lbs. fat.

100 lbs. cream must contain  $100-116.5 \times 1-4.1 \times 100$ , equal to 20.98 lbs. fat; or practically 21 per cent. fat.

According to experiments conducted at the Ontario Agricultural College Dairy School, the actual percentage of fat in cream yielding one pound of butter per inch is 21.1 per cent.

More attention should be given to the dimensions of the drivers' pails, which have been found to vary from 11 1-2 to 13 inches in diameter. The bottom and the sides should be free from bulges. Weighing the cream insures greater accuracy than measuring. A single beam with a sliding poise, such as butchers use on delivery wagons, answers well.

The relation between the value of a pound of fat and a pound of butter may be found to vary somewhat, according to the percentage of overrun obtained.

With an average overrun of 16.5 per cent., and butter worth 17 cents per pound, the value of a pound of fat may be estimated as follows:

A 16.5 per cent. overrun would prove 100 lbs. fat to yield 116.5 lbs. butter.

116.5 lbs. butter at 17 cents equals \$19.805, then 100 lbs. fat must be worth \$19.80; therefore, 1 lb. fat must be worth 19.80-100, equal to 19.8 cents.

If fat were worth 17 cents per lb., the value of 1 lb. butter would be estimated as follows:

100 lbs. fat at 17 cents, \$17.00; 100 lbs. fat will yield 116.5 lbs. butter; therefore, 116.5 lbs. butter are worth \$17.00, then 1 lb. butter is worth  $17.00-116.5$ , equal to 14.58 cents.

Assuming the average overrun in cream-gathering creameries to be 16.5 per cent., the following relation will be found between the price of fat to the patron,

and the price of butter according to the actual yield (not necessarily according to the oil test):

| Value of 1 lb. butter. Cents. | Value of 1 lb. fat. Cents. | Value of 1 lb. fat. Cents. | Value of 1 lb. butter. Cents. |
|-------------------------------|----------------------------|----------------------------|-------------------------------|
| 15                            | 17.47                      | 15                         | 12.87                         |
| 16                            | 18.64                      | 16                         | 13.73                         |
| 17                            | 19.81                      | 17                         | 14.59                         |
| 18                            | 20.98                      | 18                         | 15.45                         |
| 19                            | 22.15                      | 19                         | 16.31                         |
| 20                            | 23.32                      | 20                         | 17.17                         |
|                               |                            | 21                         | 18.02                         |
|                               |                            | 22                         | 18.87                         |
|                               |                            | 23                         | 19.73                         |

The fat content of gathered cream is usually so low that a high churning temperature is necessary. This tends to cause an undue loss of fat in the buttermilk, as well as soft butter, which is likely to retain a high percentage of caseous matter and moisture.

Other conditions causing a loss in churning are: Making a churning from lots of cream which differ in temperature and degree of acidity, and also filling the churn too full.

The buttermilk should be allowed to drain well from the churn. It is well to add a pail or two of brine at this stage. Churns should be levelled to allow a free outlet.

Wash with water at a temperature which will give the butter the proper consistency for working and expelling the surplus moisture. It is well to give butter intended for export two washings.

Salting.—Salt which has been sifted and is free from foreign flavor should be used in the proper proportion to meet the requirements of the markets. Care should be taken to distribute it uniformly.

Sometimes a preservative, in the form of boracic acid, in the proportion of one-half per cent., is used to improve the keeping quality of saltless butter.

Working.—A more uniform distribution of the salt may be obtained by giving the churn a few revolutions before placing the rollers in motion. If, after partial working, the butter can be allowed to drain a short time without undue exposure, the more complete will the process be.—[Extracts from Bulletin 135, Ontario Agricultural College.]

### Does Silage Taint Milk?

I wish to know if silage taints the milk and butter. We had some trouble a short time ago, and I named the silage; the milk tasted somewhat like the smell of it.

L. F.

Reply.—The feeding of silage to milk cows has often been objected to by buttermakers and cheesemakers, as well as condenseries, and in many instances (especially a few years ago) they have refused silage milk. Some milk condenseries, creameries and cheese factories have of late been claiming to make a superior article from silage-fed milk cows. No doubt, in the past, quality of silage had a great deal to do with the complaints. It used to be spoiled, and also fed in a very careless and lavish way. These conditions, of course, operated against the flavor of the butter. The silage of the present time is of superior quality, and is fed after milking in order to avoid the taint; of course it will taint the milk if fed just before milking, but the practice is to feed it after milking, when it gives an excellent quality. Expert judges of butter say that silage fed to cows just after milking does not injure the flavor of the butter. They claim that better flavored butter is produced from silage than from dry fodder. The gold medal at the Paris Exposition was awarded to a man who fed his cows silage that produced that milk.

I have been in dairies where there was a rank odor of silage in the barn, and where the milk was allowed to stand in open cans until the whole herd was milked; in such cases the milk absorbed the odor of the silage-tainted stable. The milk should be immediately removed to the creamery.—[Jersey Bulletin.]

### Jersey Butter Test.

The butter test held in connection with the Island of Jersey Spring Show, May 12th, 1904, seems to have been one of the best ever conducted, both in number of entries and annual yield. Fifty-six cows competed, yielding an average of 33 lbs.  $\frac{1}{2}$  oz. milk, and 2 lbs.  $\frac{1}{2}$  oz. butter, and averaging 141 days since calving. In this test the milk of twenty-four hours churned, and cows credited with one point for each ounce of butter and one point for each completed ten days since calving, deducting the first forty days, and limiting the number of lactation points to twelve. Every cow came within the standard prescribed for awarding Certificates of Merit. Two of the cows yielded 3 lbs. 2 $\frac{1}{2}$  ozs. and 3 lbs. 3 $\frac{1}{2}$  ozs. butter, respectively, in the one-day test, their milk yield being 36 lbs. and 42 lbs. 12 ozs., 135 days and 65 days, respectively, after calving.

### Best of All.

I have seen copies of several of the so-called best papers for farmers and stockmen printed throughout Canada and the United States, but not one of them is in it with the "Farmer's Advocate." We could not do without it in our homes. HENRY J. VARLEY.

### Butter Test at the Royal Show.

The two-days butter test at the show of the Royal Agricultural Society of England, held in Park Royal, London, last month, included two classes for cows of any age, breed or cross, one class being for cows exceeding 900 lbs. live weight, the other for cows not exceeding 900 lbs. There were eleven entries in each class.

The first prize of £10, and the English Jersey Society's silver medal went, in the heavier class, to Dr. Watney's Jersey cow, Wild Teasel 2nd—age 4 years, weight 934 lbs., days in milk 135, yield of milk in two days 82 lbs. 12 ozs., of butter 5 lbs. 1 oz., ratio, viz., lbs. milk to lb. butter 16.34. The second award in this class went to a Jersey and Shorthorn cross-bred cow weighing 973 lbs., her milk yield being 86 lbs., and butter 4 lbs. 10 $\frac{1}{2}$  ozs. The heaviest cow in the class was a Lincoln Red, six years old, weighing 1,638 lbs., yielding at 12 days in milk 102 lbs. in two days, and of butter 5 lbs. 5 ozs., a ratio of 19.27. She was highly commended, her total number of points in the butter test being 85, while the first-prize cow made 100 points, and the second 98.25.

In the class not exceeding 900 lbs., live weight, the first award and gold medal went to Mr. D. Mutton's Jersey cow, Primrose Day—age 8 years, weight 875 lbs., days in milk 160, milk in 48 hours 97 lbs. 2 ozs., butter 4 lbs. 12 $\frac{1}{2}$  ozs., ratio 20.31. All the entries and prizewinners in this class were Jerseys, no others competing. One cow in this class gave 100 lbs. 8 ozs. milk in the two days, and 4 lbs. 14 $\frac{1}{2}$  ozs. butter, 71 days after calving.

### The Butter-worker.

A lady contributor to Dairy Farming writes: Very few farm dairies number among their utensils a butter-worker. The bowl and ladle constitute the working outfit now, the same as forty years ago, in nine-tenths of the cases. The dash churn has given place to the barrel, the tin pans are laid aside in favor of the more modern methods of creaming, but the bowl and ladle still hold their places in popular favor with farm butter-makers.

The working of butter is something which it is very easy to overdo. An energetic woman can very easily ruin the grain in her ambition to do a good job, leaving it smooth and glossy, possessing about as much grain as so much lard, at the same time complimenting herself upon the quality of the article she has turned out. I make the statement unhesitatingly—the great majority of dairy butter suffers from being over-worked.

The question is, would the average farmer's wife do any better work if she were provided with a modern implement for working her butter? Habit, stronger than bands of iron, controls the actions of every human being. Some women, safe in their own approval, perfectly sure that they know how to make butter and make it right, will give their product just so much working, no matter what they do it with.

The principal objects in working butter are to expel the water and evenly incorporate the salt. Further than this manipulation is unnecessary, and is an absolute injury to its quality. A good many times grain is sacrificed in order to secure an extra dry quality. I have seen it worked and re-worked until the last drop of brine was expelled, leaving about as much grain as could be found in a box of vaseline.

In the public creameries good equipment usually is found. Few, if any, such establishments are conducted without a butter-worker, yet who will be brave enough to say that the butter turned out from these sources is never over-worked nor under-worked? There is no saving grace in such an implement, unless the operator knows how to use it intelligently. Where such a knowledge exists a good article will be turned out, butter-worker or no butter-worker.

Under the influence of the new thought, I learned better than to gather my butter in a solid mass, but left it in granules until after salting. This was found to be a much better method, and has never been departed from.

By having the temperature just right—controlled largely by that of the last rinse water—I found I could work the butter very nicely in the barrel churn by revolving it very slowly, allowing the contents to drop solidly from end to end. If the butter formed into large lumps the churn was opened and these cut apart with the ladle. The process was then continued.

Five minutes will be ample for working the whole churning in this way, and there will be neither streaks, mottles nor excess of brine left in. All that then remains to be done is to press it into shape with the ladle, making into prints, or packing in crocks or other receptacles for shipment. But as above stated, there must be no mistake as to the temperature—it must be exactly right. If too low the granules will not adhere, and too much moisture will be retained. If too high the butter will be soft and the grain injured. With conditions perfect, this method of working I consider to be an ideal one, and butter worked in this way will score as high in texture as any ever made.