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DIRECTIONS FOR TESTING CREAM.

L. G. RINKLE.

Cream testing is not a difficult operation. However, there are abundant chances for errors. The operation of the test must be thoroughly understood and the one making it must exercise great care or the results will not be reliable. This circular gives directions and cautions to be observed in testing cream by the Babcock method. The first part of the circular is intended especially for the cream buyer or creamery. The testing of cream on the farm is discussed in the last two pages.

Sampling the Cream.—The greatest care must be observed in sampling. More errors result from samples not being properly taken than from all other sources combined. First of all, the cream must be thoroughly mixed. This is best done by pouring it from one can to another several times. It may be mixed by stirring with

a long handled dipper, but this requires more stirring than is generally given. Probably the best thing for use in the creamery or cream station is a stiff iron rod with a slightly concave disc fastened on the end.

(Fig. 1.) By moving this up and down the cream is well mixed. No sampling tube or other device takes the place of thorough stirring. The sample for the test should be taken from the can at once. This sample should not be allowed to stand any length of time or it will dry out and cause an inaccurate test.

If the sample cannot be tested at once it should be put into a jar with a tight lid or stopper. Most cream buyers prefer to test each lot when delivered and this

is to be recommended as it gives the most accurate results.



Figure 1.—
This stirrer
should be
used to thor-
oughly mix
the cream
before sam-
pling.

Composite Sample.—This form of sample is used by all creameries buying whole milk. Its use in connection with cream is to get an average test of several cans of cream or several deliveries.

A sample is taken from each can or delivery and placed in the composite jar. (Figs. 2, 3, and 4.)

Each sample put in must be a proportionate part of the milk or cream from which it is taken. For instance, twice as large a sample is put in the composite for 50 pounds of milk or cream as for 25 pounds. The test of the composite sample then will represent a true average test of the two lots sampled.



Figure 2. — Milk bottles with metal caps furnish good, air-tight sample jars.

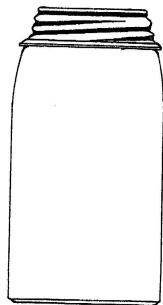


Figure 3.—Mason fruit jars are air-tight and well adapted for composite samples.

In some creameries a composite sample is made in this way from the cream delivered by each customer. The testing is done and payment made only once per week or once in two weeks. When this plan is followed some means should be employed for taking a sample in proportion to the amount delivered. A sampling tube is often used for this purpose. Another plan is to use a measure graduated to cubic centimeters. (Fig. 5.) When the cream is weighed a certain number of cubic centimeters are measured out for each pound of cream and put into the composite sample jar. The amount taken per pound of cream should always be the same.

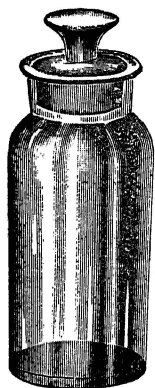


Figure 4. — Glass stoppered jars are very good to keep composite samples in.

A composite sample should be kept in an air-tight jar to prevent evaporation. It should be preserved with formaldehyde, corrosive sublimate, or potassium bichromate which will keep the sample sweet and thus avoid difficulty in testing. As each sample of each daily lot is added to the composite the contents of the jar should be mixed by rotating it. Keep the samples in a dark, cool place. The composite sample, while it saves testing, has many disadvantages and should not be used for cream where it is practical to test each lot separately. When the sample, whether composite

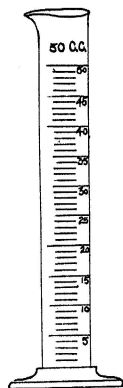


Figure 5.—The graduated cylinder is often used to measure the sample.

or not, is to be weighed out for testing, it should be warm and well mixed by pouring the cream several times from one jar to another.

Cream Should Be Weighed.—The Babcock test is based upon the use of 18 grams of milk or cream. When testing milk it is possible to measure out this amount accurately enough for all ordinary purposes. With cream the conditions are different. The cream adheres to the pipette or measure so that the amount measured out will not all go into the test bottle. Further, the cream is lighter than milk and varies in weight with its richness, so it is impossible to make a measure of any size that will deliver the correct amount, 18 grams by weight. When cream is measured out for testing with a milk pipette the reading of the test is too low. With cream testing 30 per cent, the error is about 1 per cent; with 40 per cent cream the reading is from 2 to 4 per cent too low. For the reasons given the sample of cream put into the bottle should always be weighed out on suitable scales. Moreover, this is required by the state law of Missouri as well as many other states.

Cream Scales.—Special scales for testing cream are sold by dealers in dairy supplies. The torsion balance is the most satis-

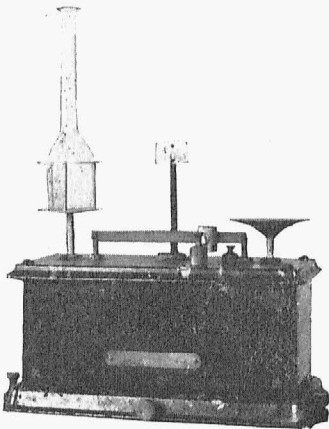


Figure 6.—When testing, the cream should be weighed out on a pair of scales and not measured.

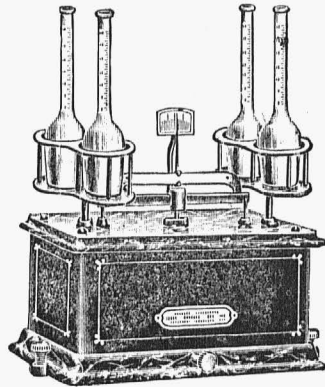


Figure 7.—A four-bottle balance which is very accurate.

factory form. It may be obtained with a capacity of from one to ten or twelve bottles. (Figs. 6, 7, and 8.) Where a large amount of testing is done the large scales are best as the work is a little more rapid. However, an error made on weighing one

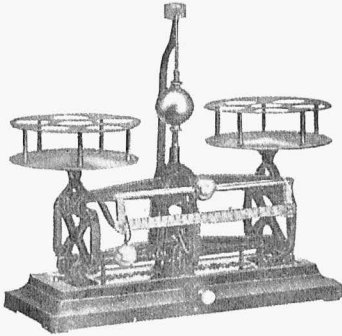


Figure 8.—Scales that will carry several bottles at a time are convenient if much testing is done.

bottle on the large scales causes an error on the next sample weighed in the same set of weighings.

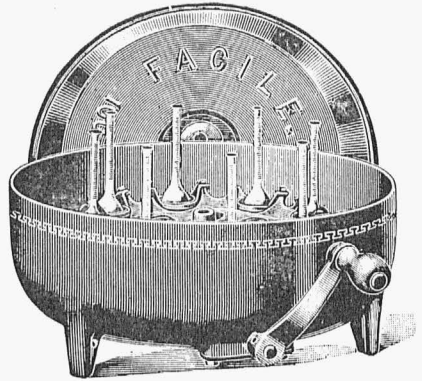


Figure 9.—Test machine that every dairy farmer should have.

The Testing Machine.—For farm use or in cream buying stations a hand power Babcock tester is best. (Fig. 9.) Creameries generally use a steam turbine machine. (Fig. 10.) As a rule the correct speed is indicated by the manufacturer. The revolving disc of a hand machine should make from 900 to 1200 revolutions per minute.

For ordinary steam turbine machines a speed of about 900 to 1000 per minute is necessary.

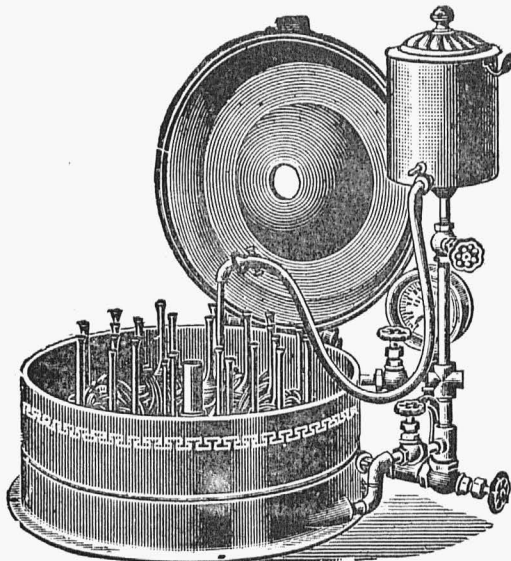


Figure 10.—The large size steam or electric test machine should be used in creameries where considerable testing is done.

The Cream Bottle.—

There are several styles of bottles found on the market, any one of which when properly used will be fairly satisfactory. Some of these are graduated to read the per cent of fat when 18 grams of cream are used. If 9 grams or one-half a charge is used the per cent of fat must be multiplied by two. The best style of

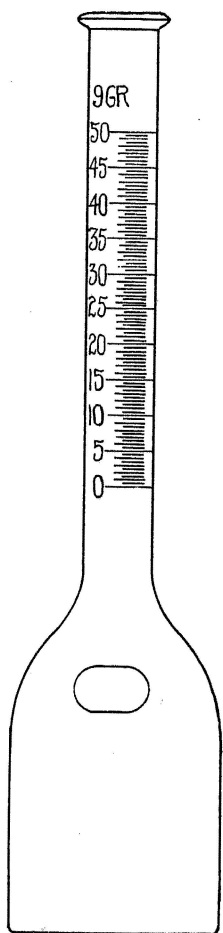


Figure 11.—A standard cream bottle should be used in cream testing.

the color of the contents of the bottle after mixing. The contents of the bottle should be mixed until the white curd disappears and the mixture takes on a dark coffee brown color. If the mixture becomes a deep black quickly the acid is too strong and less should be used. The bottle should be held in an inclined position as the acid is poured in and revolved once with the fingers while adding the acid. This washes the neck free from cream or curd particles. When the acid is in the bottle the contents should

bottle is known as the "standard cream" since it is recommended by the Dairy Instructors' Association and the United States Bureau of Standards. (Fig. 11.) It is 6.5 inches high and has scale graduated to 50 per cent, with sub-divisions to .5 per cent. The amount of cream to be used for this bottle is 9 grams.

Weighing out the Sample.—The cream bottle is placed upon one pan of the scales and balanced by means of the sliding weight. The 9 gram weight is then placed upon the opposite pan of the scales. Sufficient cream is transferred to the bottle to exactly balance the scales. To transfer the cream nothing is better than an ordinary milk pipette. The pipette is filled from the well mixed sample of cream by placing the lips over the large end and drawing the cream up into the tube by suction. If a type of bottle is used that makes it possible to use 18 grams of cream in place of 9 grams the larger weight would be used in weighing out the cream sample.

Adding the Acid.—Commercial sulphuric acid is used to dissolve all the solids in the cream except the fat. For best results the acid should be clear. When 9 grams of cream are weighed out fill the acid measure about one-half way up to the mark and mix with the cream. If 18 grams of cream are used the measure should be filled to the mark. (Fig.

12.) The amount can be regulated to the best advantage by

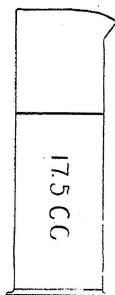


Figure 12.— Convenient measure for measuring out the acid.

be mixed with a gentle rotary motion. Avoid spilling or slopping out the acid, or shaking curd particles up into the neck of the bottle while mixing. After mixing, each bottle should be allowed to stand two or three minutes before it is put into the machine.

Operating the Machine.—The bottles are then placed in the pockets of the centrifuge or Babcock test machine. They should be placed opposite one another so the machine will be balanced. After running the machine for five minutes, stop, and fill each bottle up to the neck with hot soft water. Run the machine for two minutes more, then stop and fill the bottles with hot, soft water to within two or three divisions of the top of the scale. Run for a third and last time for one minute. The machine should be stopped and started slowly to prevent breaking the bottles and also to prevent damage to the machine.

Reading the Test.—The temperature of the fat in the bottle should be about 130 degrees Fahrenheit when the reading is taken. It cannot be made properly if the fat is cold. To get this temperature it is best to place the bottles in a vessel of water at a temperature of 130 degrees to 140 degrees for five minutes. If a machine is used that keeps the bottles hot the reading can be made without the use of hot water. The fat should be of a yellow color if the proper amount of acid is used. However, if it be somewhat darkened the reading will still be accurate if there is no sediment below the fat column.

Using too much acid is a more common mistake than using too little. If the fat is real light in color with curd below or in the fat, the action of the acid has been too weak and more should be used.

Reading the Fat Column.—In testing milk the fat column is read from the extreme bottom to the straight line which is seen at the top of the fat column. In testing cream the reading made in this way is about three quarters of a per cent too high. The exact point at which the reading should be taken is about .2 per cent above the bottom of the curved surface known as the meniscus, which is seen at the top of the column of fat. If the tests have to be read without the use of glymol the point taken for the top of the fat column should be about one-third the way up from the bottom of the meniscus or read to the bottom of the meniscus and add .2 per cent.

Use of Glymol.—The most accurate way to locate the proper point for the upper line of the fat column is by using glymol or white mineral oil. A few drops of this is dropped on the top

of the fat column and the meniscus is entirely removed (Fig. 13), leaving a straight line for the top of the fat column.

Use of Dividers.—The length of the fat column is taken most quickly and accurately by using a pair of dividers. One point is

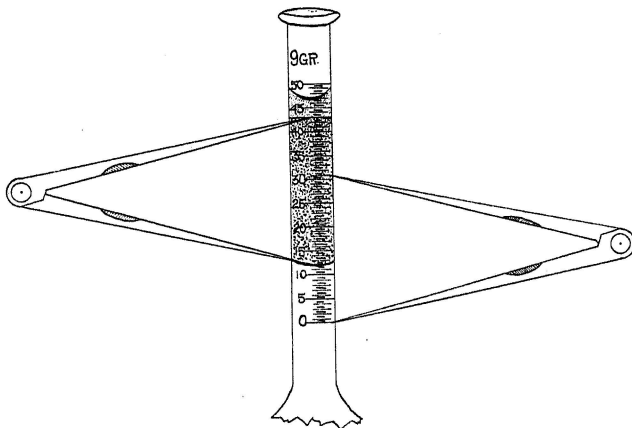


Figure 13.—Glymol breaks down the upper curve on the fat column and facilitates accurate reading.

placed on the line of division between the glymol and fat and the other at the lowest point of the fat column. (Fig. 13.) Without changing the relative position of the two points place one point on the zero mark of the scale on the bottle. The other will indicate the per cent of fat.

Testing Cream on the Farm.—Farmers selling cream or using their own product for buttermaking often wish to test cream for fat content but do not have the necessary cream scales and cream bottles on hand to do so. It is possible to make a test of cream with a milk testing outfit that will be fairly close to the correct figure. It should be clearly understood that the method as outlined should not be used in buying or selling cream and that it gives only approximate results.

Using Milk Testing Outfit for Cream.—First mix the cream well by pouring from one vessel to another. Take a small cupful of this cream and warm before measuring. This will prevent an excess of air being mixed with the cream. Measure out a 17.6 c. c. pipette full of the warm cream. Let the cream run out into a clean dry jar and use the same pipette to measure out 17.6 c. c. of warm, soft water. Let these rinsings run out into the jar with the cream. Add a second pipette full of water to the cream. This makes two pipettes full of water and one of cream. Thor-

oughly mix the cream and water. Now measure out 17.6 c. c. of the mixture and put into milk test bottle. (Fig. 14.) About 17.5 c. c. of commercial sulphuric acid is then added and the testing carried out as for milk.

As water was added to the cream a correction in the results must be made. When two pipettes of water are added to one of cream multiply the results of the test by three. If with the above dilution the amount of fat is too great to read on the scale of the whole milk bottle, a further dilution of the cream is necessary. In the case of high testing cream it may be necessary to add three or four pipettefuls of water to one of cream. In this case multiply the results by four or five, as the case may be.

By this method a 25 per cent cream should give within one per cent of the correct test. A 30 per cent cream will approximate the actual test to within less than $1\frac{1}{2}$ per cent, falling a little low. A cream testing 40 per cent may fall short of the correct figure as much as 2 per cent if tested by this method.

Cleaning Test Bottles.—The test bottles should be shaken vigorously while the contents are draining out. This dislodges the white sediment that collects in the bottom of the bottle. The bottles should then be rinsed in hot water containing a little washing powder and brushed thoroughly with a bottle brush. They should then be rinsed in clean hot water and allowed to drain. This insures a good clean bottle free from fat.

Precaution in Handling the Acid.—Sulphuric acid if handled carelessly may destroy the clothing or cause severe flesh burns.

It should be kept in a tightly stoppered glass bottle to prevent its losing strength.

The acid mixture in the test bottle should not be emptied into cement or metal sinks or sewers as it quickly eats them out.

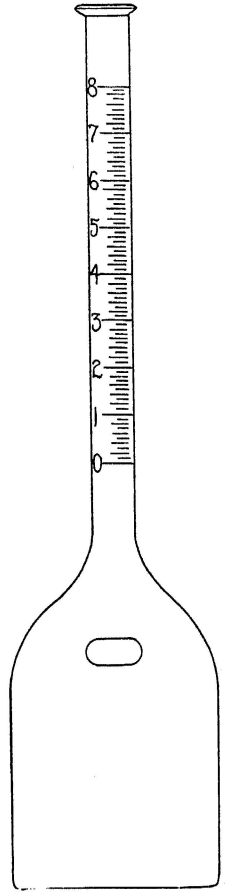


Figure 14.—Milk test bottles are often used on the farm to obtain an approximate test of cream.