

12. Weak Acid. If acid is only a trifle too weak you will get good results by warming the milk to 70° or 75° each test. If your acid is so weak that when testing milk at 50° you have a white sediment in the lower end of the fat column, you may get good results by testing the milk at 70° or 75° with the same acid.

13. Boiling Water. Boiling water should be provided for filling the bottles after they have been whirled for the first time, and for warming the contents of the bottles in cool weather. Distilled or rain water is the best for filling the bottles.

MAKING THE TEST.

14. Sampling the Milk. Every precaution should be taken to have the sample represent as nearly as possible the whole lot of milk from which it is taken.

Milk fresh from the cow while still warm and before the cream is separated in a layer may be thoroughly mixed by pouring three or four times from one vessel to another. Milk that has stood until a layer of cream has formed should be poured more times, until the cream is thoroughly broken up and the whole appears homogeneous.

No clots of cream should appear upon the surface when the milk is left quiet for a moment. Milk should not be poured more times than is necessary, as extended mixing in this way is liable to churn the cream forming little granules that quickly rise to the surface. When this occurs it is impossible to obtain a

fair sample and it is useless to make the test. Milk is sometimes churned by being transported long distances in vessels that are not full.

15. Measuring the Milk. When the milk has been sufficiently mixed the milk pipette is filled by placing its lower end in the milk can and sucking at the upper end until the milk rises above the mark on the stem; then remove the pipette from the mouth and quickly close the tube at the upper end by firmly pressing the end of the index finger upon it to prevent access of air. Then carefully relieve the pressure on the finger so as to admit air slowly to the space above the milk. Always have the upper end of the pipette and the finger dry when you measure milk, as it is almost impossible to gradually lower the milk with a wet finger. When the milk is lowered to the mark on the pipette press suddenly with the finger to prevent the milk from flowing out. Next place the point of the pipette in the mouth of one of the test bottles, held in a slightly inclined position so that the milk will flow down the side of the tube, and remove the finger allowing the milk to flow into the bottle. Then blow into the upper end to expel the drop of milk held in the point.

16. Adding the Acid. When all the samples of milk to be tested are measured ready for the test, the acid measure is filled to the 17.5 c. c. mark with sulphuric acid and from this it is carefully poured into a test bottle, containing milk, that is held in a slightly inclined position. The acid being much heavier than the milk sinks directly to the bottom of the test bot-

tle without mixing with the milk that floats upon it. The acid and milk should be thoroughly mixed together by gently shaking with a rotary motion.

17. Whirling the Bottles. The test bottles containing the mixture of milk and acid should be placed in the machine and whirled directly after the acid is added and mixed. In even numbered testers an even number of bottles should be whirled at the same time, and they should be placed in the wheel in pairs, opposite each other, so that the equilibrium of the wheel will not be disturbed. The test should never be made without the cover on the jacket. After seeing that your bearing on the machine is all right, whirl the bottles at the proper speed about five minutes; then stop, and with pipette fill the bottles with hot distilled or rain water to about the 7 per cent. mark, replace the cover and whirl the bottles about one minute. Now you are ready to measure the fat in the neck of the bottle.

Never attempt to measure the fat on any test bottle unless it is warm enough for the fat to be quite liquid. If the temperature in the room is cool, be sure and have a pail of hot water at hand when the whirling is completed. Then immerse your bottles in hot water up to the figure ten on the neck, taking them out as you get ready to measure the fat. It is impossible to get a good reading unless the fat is quite hot.

18. Measuring the Fat. The fat when measured should be warm enough to flow readily, so that the line between the acid liquid and the column of fat will quickly assume a horizontal position when the bottle

is removed from the machine. Any temperature between 110° F. and 150° F. will answer, but the higher temperature is to be preferred. The slight difference in the volume of fat due to this difference in temperature is not sufficient to materially affect results.

To measure the fat, take a bottle from its socket, and holding it in a perpendicular position with the scale on a level with the eye, observe the divisions which mark the highest and the lowest limits of the fat. The difference between these gives the per cent. of fat directly. The reading can easily be taken to half divisions, or to one-tenth per cent.

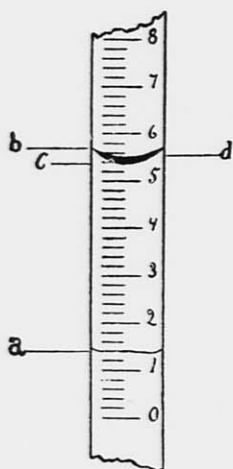


FIG. 5.

The line of division between the fat and the liquid beneath is nearly a straight line and no doubt need arise concerning the reading at this point, but the upper surface of the fat being concave, errors often occur by reading from the wrong place. The reading should be taken at the line where the upper surface of the fat meets the side of the tube and not from surface of fat in the center of the tube nor from the bottom of the dark line caused by the refraction of the curved surface. For instance, in Fig. 5 the reading should be taken from a to b and not to c or d.

The reading may be made with less liability of error by measuring the length of the column of fat with a

pair of dividers, one point of which is placed at the bottom and the other at the upper limit of the fat. The dividers are then removed, and one point being placed at the 0 mark of the scale on the bottle used, the other will be at the per cent. of fat in the milk examined.

Sometimes bubbles of air collect at the upper surface of the column of fat and prevent a close reading; in such cases a few drops of strong alcohol (over 90 per cent.) put into the tube on top of the column of fat, will cause the bubbles to disappear and give a sharp line between the fat and alcohol for the reading. Whenever alcohol is used for this purpose, the reading should be taken directly after the alcohol is added, as after it has stood for a time, the alcohol partially unites with the fat and increases its volume.

19. Testing Skim Milk, Butter Milk and Whey.

As a small amount of fat is usually present in the above products, you can get more accurate results by the use of a special test bottle, which contains twice as much as the ordinary bottle (generally known as skim milk bottle). In such a bottle twice the usual amount of milk and acid can be taken, and the column of fat being doubled, the reading can be taken with greater accuracy. Less acid is required for whey than milk.

20. Testing Cream. Cream can be tested with the regular Babcock test bottle, by dividing one pipette of cream into two bottles and diluting said cream with the same amount of water, and finish the test exactly as with milk, and add the fat of the two bot-

bles for the per cent. of fat in the cream. If the cream is quite rich use three bottles, by dividing one pipette of cream into three bottles, diluting it by adding two pipettes of water equally divided among the three bottles, and then proceed with each bottle as in testing milk, and when completed add the fat of the three bottles for the per cent. of fat in cream. Where a delicate scale is available cream may be tested by weighing about five grams in the bottle, and then multiply the reading by 18, and divide by the weight in grams taken, same as in cheese.

21. A Good Gathered Cream Test. Cream may be tested in ordinary bottles by using a pipette having a capacity of 6.04 c.c. which will deliver about six grams of average cream or one third of the weight of the usual sample. When this pipette is used about 12 c.c. water should be added to the cream in the bottle before adding the acid. The usual amount of acid should be taken and the test completed in exactly the same way as with milk. The reading should be multiplied by three to obtain the per cent. of fat in the cream.

TESTING CHEESE.

22. How to Take the Sample. Where the cheese can be cut a narrow wedge reaching from the edge to the center of the cheese will more nearly represent the average composition of the cheese than any other sample. This may be chopped quite fine, with care to avoid the evaporation of water, and the portion for analysis taken from the mixed mass.