

## DEEP SETTING SYSTEM.

In all cases the deep cans were set in water, sometimes with and sometimes without ice. When there was sufficient ice in the water surrounding the cans to hold its temperature down in the neighborhood of 40 degrees F. comparatively satisfactory results were obtained, the average test of the skim-milk being .29, or practically .3 (three-tenths) of one per cent. But where the cans were set in water at 50 to 55 degrees, without ice—a practice which is altogether too common—the skim milk tested as high as one per cent. and over; and since average whole milk contains only about 3.6 per cent. fat there was a loss of over a quarter of the butter in the skim-milk. Even when the milk was set in a tank of water at 45 degrees, without ice, the skim-milk, in several instances, tested as high as .8 (eight-tenths) to .9 (nine-tenths) of one per cent. fat, as the warm milk readily raised the temperature of the surrounding water.

Setting the milk for twelve, twenty-four, and thirty-six hours was also tried. More exhaustive creaming, and a richer cream was obtained from allowing the milk to set twenty-four hours than from allowing it to set only twelve hours; but no advantage was gained from allowing it to stand thirty-six hours before skimming.

Skimming the cream off with a conical dipper, and drawing the skim-milk off through a tap at the bottom of the can (the Cooley system) were also compared. The skim-milk tested practically the same under the two systems; but the Cooley system was found to be the speedier, and to give a slightly richer cream—less skim-milk going with the cream.

## SHALLOW-PAN SYSTEM.

Under the shallow-pan system about 2½ inches, in depth, of milk was put into each pan, and the pans were set in a room at a temperature of about 50 degrees. The average test of the skim-milk was .38 of one per cent. fat, when the milk was allowed to set 36 hours before skimming. Much better results were obtained, under this system, from setting the milk for 36 hours than for 24 hours. Of course, had the temperature of the room been much above 60 degrees the milk would have soured within 24 hours, and although the separation would have been very imperfect no particular advantage would have been gained from allowing it to set longer.

The results of experiments in the setting of milk in deep pans and shallow pans, as given in the foregoing, correspond quite closely with those carried on at the same institution, on a much larger scale, by Mr. Rogers, the butter-maker in charge. These experiments extended over a period of five years, and the results are shown in the following table:

| No. of Tests. | Pounds of Milk. | Method of Creaming. | Per cent. Fat in Skim-milk. |
|---------------|-----------------|---------------------|-----------------------------|
| 150           | 7650            | Deep setting        | .31                         |
| 150           | 7660            | Shallow pans        | .38                         |
| 150           | 7660            | Separator           | .1                          |

But the foregoing results were obtained under the most favorable conditions of setting milk, and are much better than those obtained in the average farm dairy. The same experimentalist, Mr. Rogers, went to the trouble of collecting and testing a large number of samples of skim-milk from several private dairies in the vicinity of Guelph, obtaining the following results:

| Method of Creaming. | Av. Test of Skim-milk. | Remarks      |
|---------------------|------------------------|--------------|
| Deep setting        | .86                    | No ice used. |
| Shallow pan         | .95                    |              |

This means a loss in the skim-milk of fully a quarter of the butter-fat.

## CONCLUSIONS.

In order to obtain the best results, under the deep-setting system, the milk should be set as soon as possible after milking, and before it has cooled to any great extent, and should be surrounded by water whose temperature is

held down to about 40 degrees by the liberal use of ice. This insures a rapidly falling temperature in the milk, which is very favorable to separation in different ways: The serum portion of the milk cools more rapidly than the fat, thus creating a greater difference in their relative weights and causing them to separate more readily; and again the rapid cooling of the milk causes up and down currents, the colder milk, which is heavier, going to the bottom, while the warmer milk, which is lighter, flows to the top and carries the light fat globules with it. Also, the rapid cooling of the milk tends to prevent the formation of a network of fibrin, which, when it forms, holds a portion of the fat globules in its meshes and prevents them from rising.

A tank, with an overflow pipe for the water about two inches lower than the tops of the cans, should be used for setting the cans in. The water in the tank should always be as deep as the milk in the cans.

All who adopt this system should lay in a store of ice, which should be used liberally, a fresh supply being put into the tank before the old has all melted.

Where a conical dipper is used for skimming it should be about six inches deep and five to six inches across the top, and should have no wire or flange around the top. It should be dipped into cold water, or preferably skim-milk, before using, to prevent the cream from sticking to it. Where the skim-milk is drawn off the bottom of the can should slope downwards to the tap, so that any sediment that there may be will be carried off with the skim-milk instead of remaining to mix with the cream.

The best length of time to allow milk to set before skimming, under the deep-setting system, is 24 hours.

Where the shallow-pan system is adopted the milk should not be more than 2½ inches deep, the temperature of the room should be below 60 degrees, and the milk should be allowed to set 36 hours before skimming. The best way, in so far as we know, to skim the cream off shallow pans is as follows:

First run a thin bladed knife, kept for the purpose, around the pan to free the cream from it; then, holding the cream back with the knife, tilt the pan and allow enough skim-milk to flow over to wet the edge and prevent the cream from sticking to it, after which the cream may be floated off, using the side of the knife to assist in so doing. A ladle-shaped, perforated skimmer should never be used, as it allows all the thin portion of the cream to flow through the small holes in it and mix with the skim-milk. Such a skimmer is a great source of waste.

Where the conditions for deep-setting are all favorable it is a better system than the shallow-pan system, giving slightly more exhaustive creaming, and keeping the cream sweeter; but where the conditions are unfavorable for deep-setting and fairly favorable for the shallow-pan system, it is frequently better to adopt the latter, provided the cream is churned at home. The shallow-pan system is not suitable where the cream is sent to a creamery, as the milk remains at a much higher temperature, during the time it is set, than milk in deep cans; and the cream is usually somewhat sour when skimmed off the pans, becoming over-ripe before it arrives at the creamery. If cream is to be sent to a creamery, either the deep-setting system or the use of a separator should be adopted.

When a separator is used the cream should be cooled immediately after separating, and before it is mixed with the cold cream.

A word by way of comparison of the different methods of creaming milk. With the adoption of the most favorable conditions under the gravity method, the skim-milk will contain about .3 (three-tenths) of one per cent. of fat, and usually the loss is much greater; while with the separator the loss need not exceed half a tenth to a tenth of one per cent. Since average whole milk tests about 3.6 per cent. a test of .3 (three-tenths) for the skim-milk means a loss of about one pound of butter in every twelve; while a test of .1 (one-tenth) of one per cent. for the skim-milk means a loss of only one pound in thirty-six; that is to say, a comparison of the best work done under the gravity