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MAKING CHEDDAR AND COTTAGE CHEESE ON THE FARM

By

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MAKING CHEDDAR AND COTTAGE CHEESE ON THE FARM

By

R. N. DAVIS

MAKING CHEDDAR CHEESE

Because of the distance from market and lack of transportation facilities, dairymen in some sections of Arizona are at disadvantage in marketing their product. If marketed at the creameries in the form of cream, the transportation cost is high, and during the summer months the cream often reaches the creamery in bad condition. The market in these sections for dairy butter is limited while Cheddar cheese of good quality finds a ready market at satisfactory prices. The northern counties have cold water and the nights are cool during the summer. These factors are favorable for the production of cheese of good quality. Therefore, it seems that Cheddar cheese is the best form in which these dairymen can market their product.

YIELD OF CHEESE

The yield of cheese varies with the fat content of the milk, amount of water retained in the cheese, and with the amount of milk solids lost in the process of manufacture. Ten to 11 pounds of cheese are obtained from 100 pounds (11 $\frac{2}{3}$ gallons) of average milk.

QUALITY OF MILK

It is very essential in cheese making to use only the best quality of milk, which has come from healthy cows and has been handled under sanitary conditions. The milking should be done in a clean barn free from dust or foreign odors. The flanks and udders of the cows should be wiped with a damp cloth just previous to milking. Small-topped pails which keep out the dirt should be used.

CHEESE VAT

A wash boiler or tub may be used for making cheese but if a considerable amount is to be made a regular cheese vat should be provided. The wash boiler is preferable to the tub because in the use of the latter there is a possibility of poisoning from zinc lactate if too much acid is developed. A water jacket may be provided by setting one tub inside another tub and putting water in

the outer one. This will help to control the temperature, which is very essential in cheese making.

The local tinner can make a satisfactory cheese vat at a small cost, or dairy farm cheese vats may be purchased from any creamery supply house.

WASHING UTENSILS

All milk pails and other utensils should be washed immediately after using. First rinse the pails with cold water; then wash thoroughly with hot water containing an alkaline washing powder, such as sal soda, after which *thoroughly scald* with boiling water and place in the air and sun. Always use a bristle brush to wash milk containers. *Never mop them out with a cloth.* After they are scalded, let them dry from the heat which they have absorbed from the water. These instructions for the care of milking pails apply also to the cream separator and all other containers used in handling milk.

PREPARING THE MILK

If the milk is to be held for several hours before it is made into cheese, it should be cooled promptly, after being drawn, to a temperature of 60 degrees F. or lower, and held at that temperature until time for setting the milk.

The milk should contain between .17 and .19 per cent of acid, not over .20 per cent. Milk will not taste sour until it contains about .30 per cent of acid. The milk from both evening and morning milkings may be put together in one batch, provided the first-drawn milk is still perfectly sweet. If freshly drawn milk is made into cheese, about 2 per cent of starter (1 quart to 10 or 12 gallons of milk) should be added before adding the coloring and rennet. A starter is milk containing a culture of lactic acid bacteria. It may be prepared by setting good, clean skim milk at 65 to 70 degrees F. until it sours. Good, clean buttermilk, not too old, may be used as a starter. Use only a good starter of pleasant flavor, because this will have a great deal to do with the flavor of the finished product.

SETTING THE MILK

Warm the milk to 86 degrees F. *Use a thermometer; do not guess at the temperature.* Add coloring to suit the market, or according to instructions given on the package in which it is secured. Dissolve the coloring in about one half glass of cold water and stir the milk thoroughly when it is added. Sufficient rennet should be used to coagulate the curd in twenty-five to thirty-five minutes, or according to instructions on container. Rennet tablets are the most convenient to use under farm conditions.

Dissolve the rennet in about one half glass of water. Add the rennet slowly and stir gently. The stirring should continue for about five minutes to insure a perfect mixture. To prevent the

butterfat from rising to the top, occasionally stir the top of the milk very gently until the curd begins to set, then cover with cloth and let stand quietly.

CUTTING THE CURD

The curd is ready to cut if it will break clean before the index finger thrust about $\frac{1}{2}$ inch deep into the curd and pushed slowly through it. If the break is clean, that is, does not leave particles on the finger and leaves clear and not milky whey in the break,

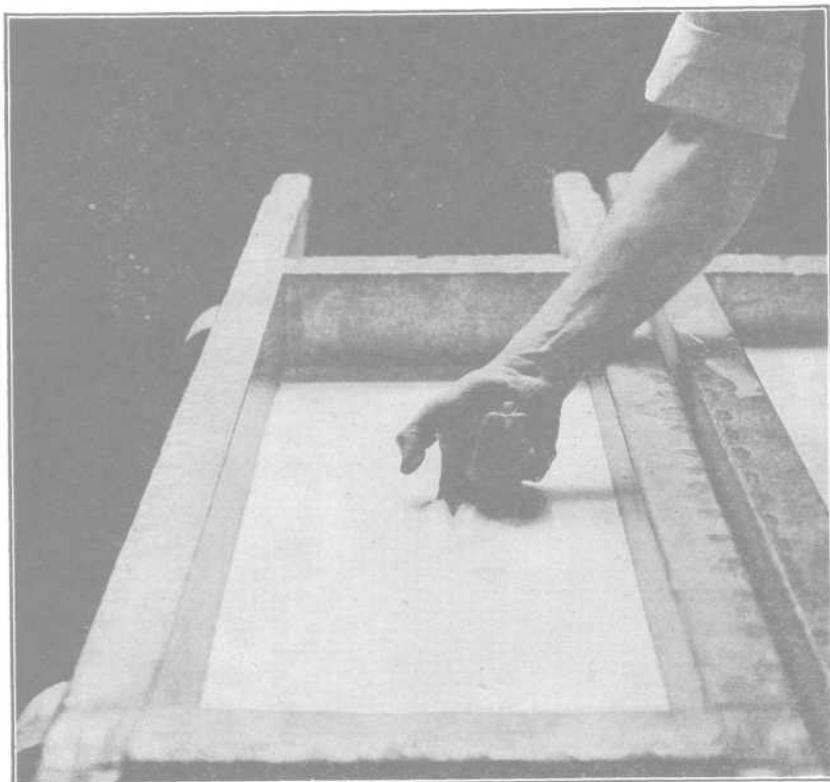


Plate I.—The curd is ready to cut when it breaks smoothly before the finger and leaves clear whey.

the curd is ready to cut. Another method used to determine when the curd is ready to cut is to press on the curd near the edge of the container with the back of the hand. If the curd breaks away cleanly from the sides of the container, it is ready to cut. If the curd is cut too soon, there will be a large loss of fat in the whey; if cut too hard, it will cut with difficulty, and it will take longer to cook the curd. It is best cut with regular

curd knives into uniform $\frac{1}{2}$ -inch cubes. The curd should be cut first lengthwise of the vat with the horizontal knife, then crosswise with the vertical knife and finally, lengthwise with the vertical knife. The curd knives should be inserted and removed from the curd with a circular movement so as to cut the curd and not mutilate it. The curd knife should be moved to the opposite end of the vat from insertion, then given a half-turn, and this process continued until the curd is cut before removing the knife.

COOKING THE CURD

Shortly after the curd has been cut, it will begin to settle to the bottom of the vat. At this stage gradually raise the temperature to 98 to 100 degrees F., usually in from fifteen to twenty minutes. The temperature should be raised slowly; about 2 degrees every five minutes. The curd should be stirred gently at

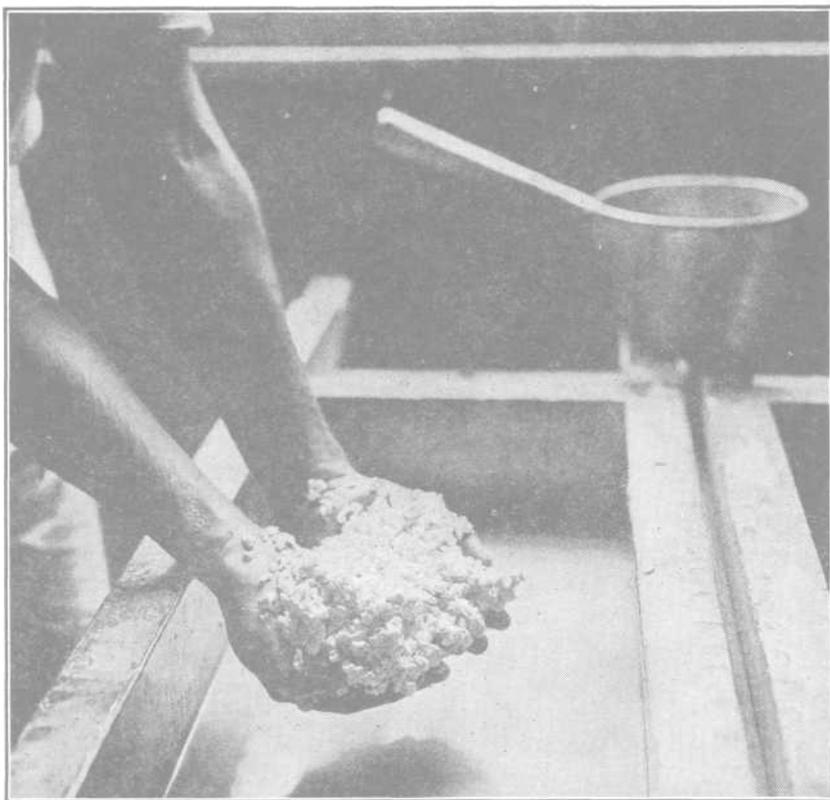


Plate II.—The whey should be drawn when the curd falls apart readily after a handful has been pressed together and the pressure removed.

frequent intervals from the time it is cut until it is ready to dip (remove the whey). If the milk is overripe, the temperature should be raised faster, and it is necessary to cook at a higher temperature, possibly 110 degrees F. This also applies to a gassy curd.

TIME TO DRAW THE WHEY

The whey should be drawn when the curd falls apart readily after a handful has been pressed together and the pressure removed. If it remains in a "mashed-up" mass, it is not sufficiently cooked. Ordinarily, it will require from two to three hours after cutting the curd before the whey is removed. A curd cut when soft will cook faster than a hard curd. If the curd is too firm when the whey is drawn the cheese will likely be dry and "corky," while if the curd is not firm enough the cheese will be soft and likely to sour.

CHEDDARING

There are two processes of handling Cheddar cheese between the stages of removing the whey and salting the curd, the "granular system," in which the curd is kept in the granular form, and, the "matting or cheddaring system," in which the curd is allowed to "mat" or settle into a solid mass as soon as the whey is removed. If the amount of cheese made at one time is large enough and the necessary equipment is available so that the temperature can be controlled, the matting system is preferable because the fermentation of the cheese can be better controlled, the loss of fat in the whey is less, and it requires less salt. Less time is necessary where the granular system is used and this system is generally preferable if only a few gallons of milk at a time are made into cheese.

In the granular system the whey is drawn off and the stirring continued by hand. After stirring fifteen to twenty minutes, the curd becomes so dry as not to mat easily. As soon as the curd has reached this state, the salt is evenly and thoroughly mixed with it. The curd should be spread out and the salt added in three applications, thoroughly stirring after each application. The curd should be cooled to about 90 degrees F. before the salt is added and to about 85 degrees before pressing. After salting, the curd will have a harsh feeling, due to the undissolved salt crystals. It should not be pressed until it has regained its velvety feel, which is usually in about fifteen to twenty minutes.

In the matting or cheddaring process, on removing the whey the curd is gathered in a pile in one end of the vat and allowed to mat. In about ten to fifteen minutes, after the curd has matted so the particles stick together in one solid mass, it is cut into strips 4 to 8 inches wide. The strips are turned occasionally to assist draining and in a few minutes should be piled two deep. The turning should continue until the curd has become sufficiently dry and has developed the proper texture for milling. At

this stage it should assume a meaty texture and tear like the cooked breast of a chicken. In the milling process the curd is cut into pieces $\frac{1}{2}$ to 1 inch in diameter.

SALTING

The curd should not be salted for fifteen to twenty minutes after milling and should not be pressed for fifteen to twenty minutes after salting. The temperatures for salting and pressing and the method for adding the salt are the same in this as in the granular system. Ordinarily, 3 ounces of salt should be used to the curd from 10 gallons of milk with the matting system and 4 or 5 ounces of salt to the curd from 10 gallons of milk where the granular system is used.

PRESSING THE CURD

The pressure should be gradually applied and in sufficient amount to close the rind of the cheese. After it has been in the press two or three hours, it should be removed and dressed; that is, the cheesecloth should be straightened and any rough edges of the cheese carved off. It should then be put back into the press and should remain overnight.

On being removed from the press, the cheese should be placed in a cool room or cellar. The atmosphere in the curing room should be moist, and the temperature not higher than 65 to 70 degrees F. A temperature of 40 to 50 degrees F. would be better. The cheese should be turned daily on the shelf for two weeks, then twice a week until ripe. It should be allowed to ripen from six weeks to three months before being consumed.

All cheese should be paraffined as soon as the rind is dry. With average conditions in Arizona it will be ready to paraffin in 3 to 6 days. The paraffin should be hot, from 220 to 240 degrees F., and the cheese should be dipped into it for six to fifteen seconds. This process will prevent cracking and molding, and reduce the evaporation.

RIPENING

Conditions Favorable for Fast Ripening

1. High temperature in ripening room.
2. High moisture content in the cheese.
3. Large amounts of rennet.
4. Low salt content.
5. Large size of the cheese.
6. Low acid content.

Conditions Favorable for Slow Ripening

1. Low temperature in ripening room.
2. Low moisture content.
3. Smaller amount of rennet.
4. More salt.
5. Small size of cheese.
6. No acid or an excess of acid.

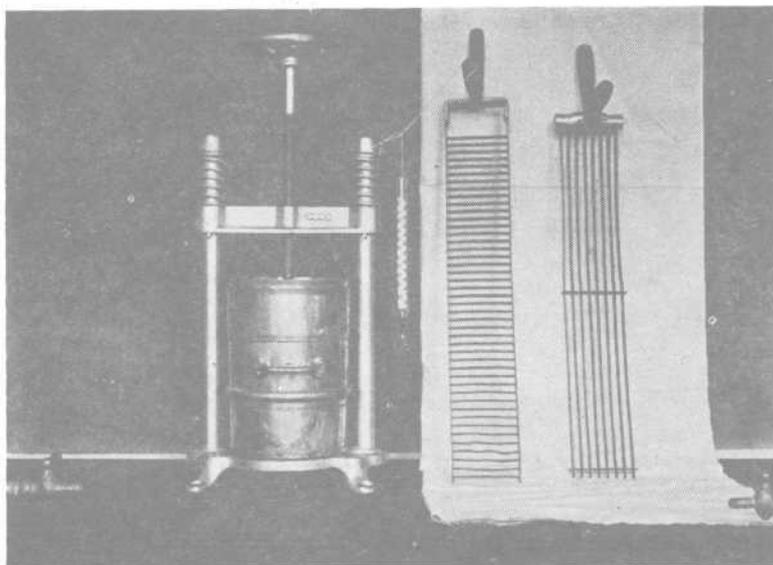


Plate III.—Cheese press, thermometer, and curd knives. These are all essential in cheese making.

APPARATUS FOR CHEESE MAKING

Cheese Vat

To control the temperature, it is necessary to have a water-jacketed container. A large, metal wash tub and a wash boiler which will sit inside the tub can be used for this purpose.

Stirrer

A regular milk stirrer or a big dipper should be used to stir the milk.

Thermometer

It is very essential that a thermometer be used.

Knife

Regular curd knives should be used. They do not cost much and will soon pay for the expenditure.

Cheese Press

Fruit presses may be used for cheese presses or a press may be made by thrusting one end of a 4- by 4-inch plank under a support so it may be used as a lever. Molds can be made from heavy tin or galvanized iron. The local tinner should do this at little expense. Molds 7 inches in diameter and 10 inches high make a

desirable shaped cheese. Two followers made from 1-inch plank should be provided for each mold.

Cheesecloth

Cheesecloth should be used for bandages in pressing cheese. It costs very little.

Rennet and Coloring Tablets

These can be secured from some drug stores and from all creamery supply houses.

SUMMARY: STEPS IN MAKING CHEDDAR CHEESE

1. Use only good, clean milk.
2. If milk is to be held several hours before setting, cool it promptly after it is drawn.
3. Warm milk to 86 degrees F. Add coloring and stir thoroughly. Add enough rennet so the curd will be ready to cut in twenty-five to thirty-five minutes. Stir gently about five minutes; then stir occasionally until the curd starts to set; cover, and let stand quietly.
4. When curd is properly set, cut into $\frac{1}{2}$ -inch cubes.
5. Stir gently when curd starts to settle.
6. Gradually heat to 98 to 100 degrees F.
7. Test firmness of curd by squeezing a double handful.
8. When the desired texture is reached, draw the whey.
9. If the "granular system" is used, continue to stir the curd by hand. Salt the curd when it gets dry enough not to stick together easily. This system is generally preferred in farm cheese making. If the "matting system" is used, let the curd mat in one end of the vat.
10. Cut into strips as soon as it has matted. Stack curd two strips deep. Turn occasionally.
11. When the curd assumes a meaty texture and tears like the breast of a chicken that is well cooked, it is ready to mill (cut up into small pieces).
12. Salt the curd fifteen or twenty minutes after milling; or after removing the whey if the "granular system" is used.
13. In either system press the curd as soon after salting as the velvety texture has been reestablished, fifteen to twenty minutes after salting.
14. Dress the curd (straighten the bandage and trim) about two hours after putting in press. Press again for fourteen to twenty-four hours.
15. Turn the cheese on the shelf daily for two weeks, then twice a week.
16. Paraffin the cheese as soon as the rind is dry.

MAKING COTTAGE CHEESE

EQUIPMENT

The same apparatus is required for making cottage cheese as that used in making Cheddar cheese, with the exception of the press. If cheese is made from very small quantities of milk, as a few quarts or a gallon or two, a container may be provided by using a small pail for the milk and placing this into a larger pail containing water. An ordinary butcher knife may be used for cutting the curd where very small amounts of cheese are made, or the curd may be broken by stirring the milk gently with a large spoon or similar utensil.

A galvanized iron container should not be used in setting milk for cottage cheese.

MILK

Pasteurized skim milk is preferable for cottage cheese, but good quality raw skim milk may be used. In fact, raw milk is generally used for cottage cheese in home cheese making, because of the inconvenience of pasteurizing. If the milk is pasteurized, it should be heated at a temperature of 145 degrees F. for thirty minutes and cooled rapidly to setting temperature or below 50 degrees F. if the milk is not to be set immediately. It is essential that the pasteurizing temperature be carefully controlled as a high temperature will result in a curd which is not sufficiently firm.

SETTING THE MILK

Two methods may be used in setting the milk. The choice will depend largely upon the most desirable length of time from setting to cutting. If it is desired to set the milk in the afternoon and have the curd ready to cut the next morning, the milk is brought to a temperature of 70 degrees F.; $\frac{1}{2}$ to 1 per cent of a good culture is added, and the milk held at this temperature overnight. If it is desired to complete the entire process in one day, the milk is brought to a temperature of 90 degrees F., and 5 to 10 per cent starter is added. In this method, the milk is set as early as convenient in the forenoon. Coagulation should take place in two and a half to four hours. It is advisable not to add more starter than is necessary to produce curdling in a reasonable time. Large amounts of culture will likely produce a weaker curd and result in a more grainy cheese. It is very essential that the culture be thoroughly mixed with the milk at the time of adding, regardless of the amount used.

Either of the two methods will produce good cheese. The last mentioned method has some very desirable features. It requires very little heating after cutting for the whey to start separating. A setting temperature of 90 degrees F. produces a curd of superior

texture, and it requires less time to bring the curd to cooking temperature.

CUTTING THE CURD

If the high setting temperature (90 degrees F.) is used, the curd should be ready to cut in twenty to thirty minutes after the first signs of thickening appear. The curd, when ready to cut, should have a soft jellylike appearance, and should split with a clean break. It is very important that the curd be cut soon after it forms. If too much acid is formed before the curd is cut, the result will likely be a rough, grainy cheese, which will cook slowly and possess poor keeping qualities.

The curd should be cut in cubes of about $\frac{1}{2}$ inch. The same curd knife used for cutting Cheddar cheese may be used, and instructions given for cutting Cheddar curd will apply to cutting cottage cheese.

COOKING

The curd should be stirred very little, and the temperature raised slowly. The curd should be neither heated nor stirred for twenty to thirty minutes after cutting. From one to two hours is required to reach the cooking temperature of 120 degrees F.

The temperature is raised by adding small amounts of hot water (170 degrees F.). The water should be added carefully to prevent breaking the soft curd and the curd stirred gently to mix the hot water evenly through the whey. As the whey separates, a portion of it may be removed to make room for more water.

Cooking may be accomplished by adding hot water to the jacket surrounding the vat, but it requires more stirring which will likely result in a more granular cheese and the quality not quite so good as that of water-cooked cheese.

The time required to cook the curd after a temperature of 120 degrees F. has been reached will vary from a few minutes to a half hour. A small quantity of curd cooled by placing in a cup of cold water will enable one to determine when the curd has reached the proper firmness and will show the properties of the curd when cooled. The curd is sufficiently firm when a broken cube shows no milkiness, and the cubes feel reasonably firm.

As soon as the curd is sufficiently firm, the whey should be removed and the curd cooled with cold water. Remove the whey until the curd is visible, then add cold water, stir thoroughly, and then drain off the water. The washing process is repeated two or three times or until the curd is cooled to at least 70 degrees F., preferably 60 degrees F. Only part of the whey is removed before the first washing, because too rapid cooling will cause shattering and may affect the cube form of the cheese. The draining process may be completed through cheesecloth or muslin sacks.

SALTING

The curd should not be salted until the proper firmness has been reached because drainage usually stops when the cheese is salted. The cheese should be salted to taste, usually about 1 per cent of salt is added—1 ounce of salt to 6 pounds of curd. The salt should be added in two portions, each portion being thoroughly mixed with the curd

CREAMING

Creaming improves the palatability of cottage cheese for most people. Fifteen per cent cream is satisfactory for this purpose. Cream is added at the rate of about one fourth to one third of the weight of the curd. The cream should be largely absorbed by the cheese leaving only enough free cream to give a rich, pleasing appearance.

USE OF RENNET

A little finer textured and more uniform cheese may result from the use of rennet in cottage cheese. However, a flaky type cheese of splendid quality may be made without the use of rennet. It is questionable whether or not one inexperienced with rennet should use it in cottage cheese because of the tendency to use too much. Unless properly used, toughness and whey leakage may result. If rennet is used, the amount of starter should be reduced, and rennet extract added at the rate of about three drops to 12 gallons of milk. The rennet extract should be diluted in about forty times its volume of water. If extract is not available junket tablets may be used. Dissolve one tablet in 1 quart of water and add one tablespoonful of this solution to each gallon of milk. The rennet should be added slowly, and the milk stirred thoroughly at the time of adding.

YIELD OF COTTAGE CHEESE

The yield of cheese will vary considerably, but will depend largely upon the amount of water left in the curd. If the making process is properly controlled, the yield should be about 15 to 16 pounds per 100 pounds of skim milk. Cooking the curd too long or at too high temperatures will likely reduce the yield. An unevenly coagulated curd or cutting the curd too fine also tends to reduce the moisture content. If the cheese is creamed, the weight will be increased by the amount of cream added.

SUMMARY: STEPS IN MAKING COTTAGE CHEESE

1. Use only good, fresh skim milk.
2. Bring temperature to 90 degrees F.

3. Add starter at rate of $\frac{1}{2}$ to 1 pint per gallon of milk. Stir thoroughly. Use good starter.*

4. If rennet is used, it should be added at this time. Add rennet at rate of one drop to 4 gallons of milk. Dilute rennet extract in one half glass of cold water, add slowly and stir vigorously. If junket is used, dissolve one tablet in a quart of cold water and add one tablespoonful of this solution for each gallon of milk.

5. Let milk stand until a soft jellylike curd is formed, which will split with a clean break. This should take from two and one half to four hours.

6. Cut the curd into $\frac{1}{2}$ -inch cubes.

7. Let stand for twenty to thirty minutes.

8. Raise the temperature very slowly to 120 degrees F. by making small additions of hot water (170 degrees F.). Stir the curd only enough to distribute the hot water. It should take from one to two hours to bring the temperature to 120 degrees F. It will require from a few minutes to a half hour to complete cooking after the cooking temperature is reached.

9. The curd is sufficiently firm when a broken cube, cooled in cold water, shows no milkiness, and the cubes feel reasonably firm.

10. When the curd is sufficiently firm, remove the whey to the top of the curd and add cold water. Remove the water and make additional applications of cold water until the temperature of the curd is down to 60 degrees F.

11. Drain the curd and salt it when the proper firmness has been reached; salt to taste; usually about 1 per cent of salt is added.

12. If cream is added, cream and store in a cold place.

*Starter or culture is sour milk containing lactic-acid-producing bacteria which produce desired flavor and curd. Good, clean, fresh buttermilk may be used or a starter may be prepared by setting good, fresh skim milk at 70 degrees F. and let sour. A better starter may be prepared by securing a culture from a commercial laboratory. Instructions for developing this should be given on the container. The starter should be fresh and not too sour.