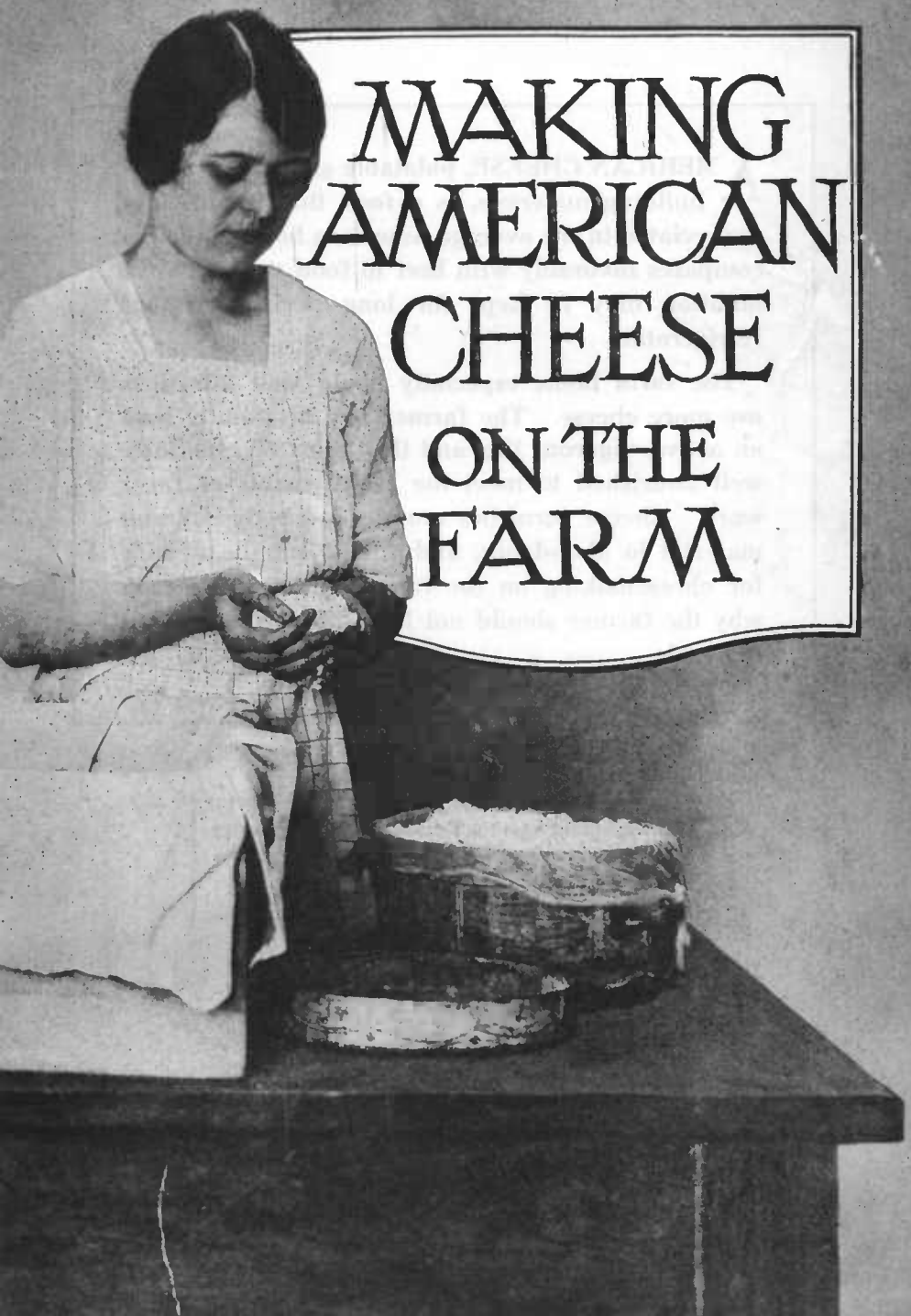


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FARMERS' BULLETIN -- 1191
UNITED STATES DEPARTMENT OF AGRICULTURE

A black and white photograph of a woman with dark hair, wearing a white dress and a checkered apron, focused on her work. She is standing at a dark wooden table, handling a piece of cheese curd in her hands. On the table in front of her is a large, round wooden mold filled with a mass of white cheese curds. The background is a plain, light-colored wall. The title text is overlaid on the right side of the image, enclosed in a decorative frame.

MAKING AMERICAN CHEESE ON THE FARM

A MERICAN CHEESE, palatable and rich in body-building materials, is a food that is not fully appreciated in the average American home. Cheese compares favorably with beef in food value, and in addition may be kept for long periods without refrigeration.

The farm home especially could well afford to use more cheese. The farmer and his family lead an active, vigorous life, and they must be especially well nourished to meet the requirements of farm work. Cheese furnishes muscle and body-building material in abundance, and with a supply of milk for cheesemaking on the farm there is no reason why the farmer should not have this good food on his table.

Contribution from the Bureau of Animal Industry

JOHN R. MOHLER, Chief

Washington, D. C.

June, 1921

MAKING AMERICAN CHEESE ON THE FARM.

C. M. GERE, *Dairy Division.*

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Cheese may be made at any time of the year, and on farms where there is a surplus of milk during certain seasons cheesemaking offers an exceptionally advantageous means of conserving, for later use, milk which otherwise might be wasted. The making of cheese does not require a great deal of time, and if good milk is used and directions are followed no one should have difficulty in making good cheese.

Approximately five or six hours are required from the time the milk is placed in the vat for heating until the cheese is put into the hoop for final pressing, and during that time it is not necessary for the operator to give it his entire attention. From this point until the end of two weeks only a few minutes are required each day to turn the cheese. After that time the cheese is turned only twice a week until fully cured.

For making cheese in small quantities on the average farm the Cheddar process used in factories is somewhat too complicated to be practicable. With the more simple method, known as the hand-stirred or granular process, presented in this bulletin, however, good cheese can be produced on the farm.

CONDITIONS FAVORABLE FOR FARM CHEESEMAKING.

Best results have been obtained in regions where the nights are cool throughout the summer and where cool water may be obtained. These factors favor the production of a high-quality cheese. Where these conditions do not exist it is more difficult to produce a high-quality cheese during warm weather, as gas-producing bacteria are more abundant at that time.

Only whole milk should be used, as skim-milk cheese made by this method is hard, dry, and lacking in flavor.

Because the market requires a uniform product it is not generally economical or practicable to make farm cheese for the general mar-

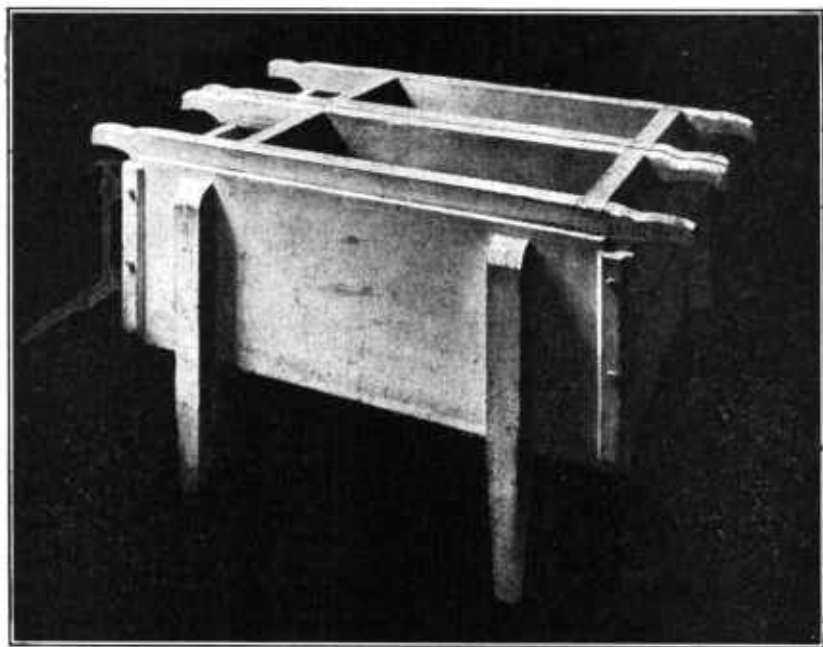


FIG. 1.—Wood-jacketed cheese vat.

ket. Cheese that is satisfactory for home consumption, however, can be made wherever a supply of fresh, clean milk is available.

YIELD OF CHEESE.

Approximately $10\frac{1}{2}$ pounds of cheese are obtained from 100 pounds ($11\frac{2}{3}$ gallons) of milk containing 4 per cent butterfat. The yield varies with the fat content of the milk and also with the quantity of solids lost in the process of manufacture. A cheese of any size may be made.

It is important to have fresh, clean milk for cheesemaking. If milk is to be kept overnight it should be cooled to a temperature of 60° F. or lower and held at that temperature until used. The milk should not be held more than 12 hours, as it is very essential that the milk be perfectly sweet.

**THE CHEESE
VAT.**

A wash boiler, large kettle, or tub may be used for cheesemaking, but if cheese is to be made frequently or on a fairly large scale a regular cheese vat is more satisfactory. A cheese vat is so constructed that hot or cold water may be circulated around the milk for regulating the temperature.

Having control of temperature throughout the manufacturing process is essential to the successful making of cheese. A good thermometer therefore should be used.

The milk is heated in the vat or wash boiler to a temperature of 86° F., at which it is held until after the curd has been cut.

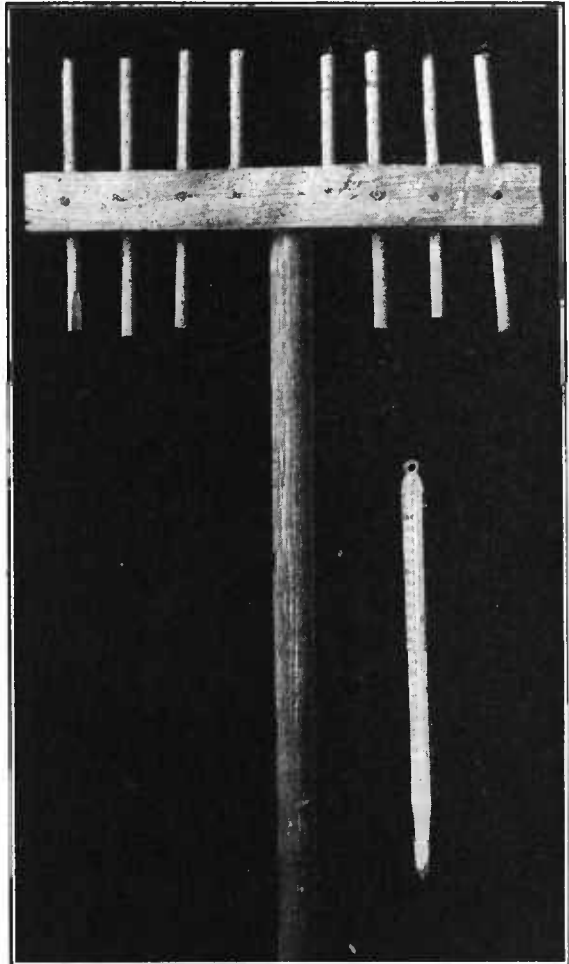


FIG. 2.—Homemade rake for stirring the curd. Floating dairy thermometer at right.

COLORING.

Cheese made without the addition of coloring matter is light yellow or straw color. If a deeper shade of yellow is desired a small

quantity of coloring is put into the milk. Regular cheese color should be used and not butter color, as the latter colors the fat but not the curd. From $\frac{1}{2}$ to 1 teaspoon of cheese color to 100 pounds of milk is sufficient. The color should be stirred thoroughly through the entire mass of milk.

· ADDING RENNET.

Rennet extract, which is used to curdle the milk, may be obtained from a dairy-supply house. If the extract is not available rennet

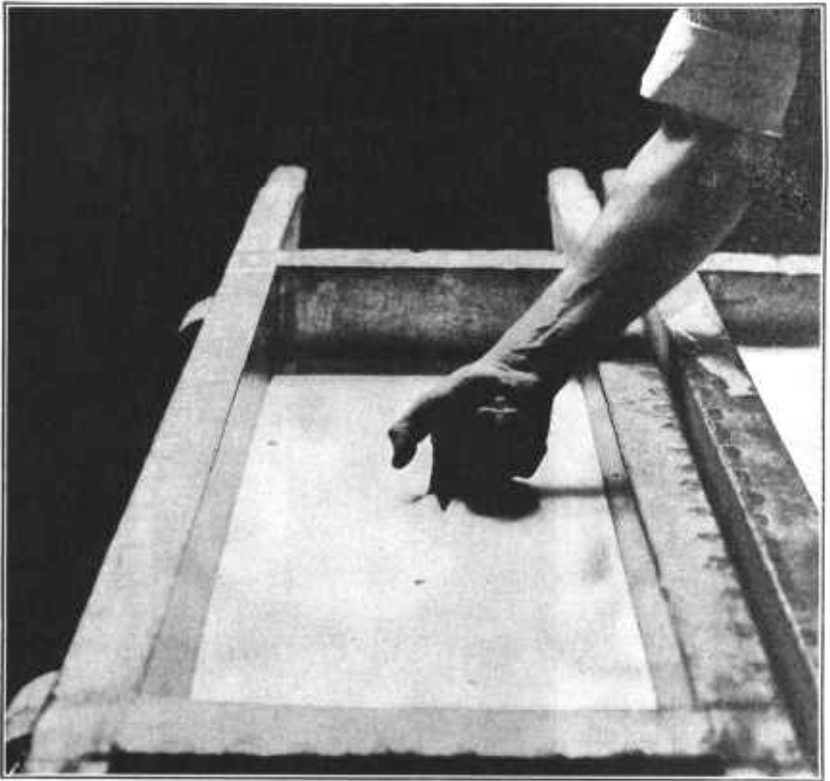


FIG. 3.—Trying the curd. The curd is ready to cut when it splits smoothly over the finger.

tablets may be used, which sometimes may be obtained at drug stores. Rennet should be added at the rate of $\frac{1}{3}$ ounce or 2 teaspoons for each 100 pounds of milk, or enough to curdle the milk in from 30 to 45 minutes. The rennet should first be mixed with a pint of cool water and then stirred into the milk very thoroughly, and the stirring continued slowly for about 3 minutes. It is very important that the temperature of the milk at this time be 86° F. and that it remain at this temperature until the curd is properly set, which should be in

from 30 to 45 minutes, depending upon the quantity of rennet used, the acidity, and other qualities of the milk. After the rennet has been stirred in, the milk must stand undisturbed until curdled. If there is the slightest motion to the milk while curdling the curd will not be firm. The vat should be covered to keep the surface of the milk from cooling.

CUTTING THE CURD.

The curd must be cut at the right stage of firmness. If cut when too soft it will be broken up, resulting in a loss in yield, or if allowed to get too hard it will be cut with difficulty. The usual method of determining the proper stage for cutting is to insert the forefinger in the curd at an angle of 45° and about ½ inch under the surface. The finger is then raised slightly and the curd split with the thumb. If the curd splits smoothly without leaving particles on the finger it is ready to be cut. Special curd knives may be obtained for cutting the curd into cubes of equal size. Uniformity in the size of these cubes is necessary to insure uniform firming of the curd. The curd should first be cut lengthwise of the vat with a horizontal curd knife and then cut crosswise with a vertical knife, and finally lengthwise with the vertical knife, thus leaving the curd in small cubes. To insure a maximum yield of cheese it is necessary to avoid crushing the curd or breaking it into very small pieces. The curd knives should be inserted and removed from the curd in such way as to cut the curd rather than to crush it. The horizontal knife should be placed in the vat as shown in figure 5, and moved slowly to the opposite end of the vat, where it is turned halfway round, and not removed from the vat until all the curd has been cut.

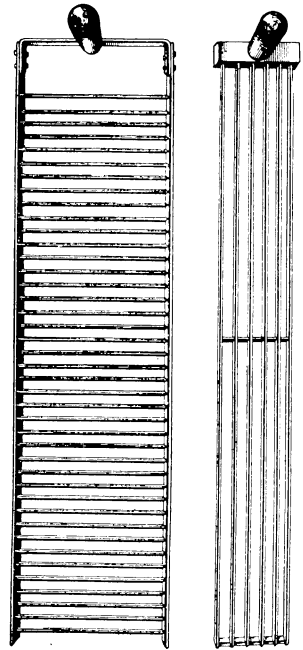


FIG. 4.—Curd knives, for cutting horizontally and vertically.

If curd knives are not available the curd may be cut with a large butcher knife, cutting both lengthwise and crosswise of the vat, and then, after carefully giving the curd a quarter turn so that one side is now on top, cutting lengthwise again. When the cutting has been completed the pieces of curd should be about ¾ inch in size, each dimension.

HEATING AND STIRRING THE CURD.

As soon as the curd is cut it should be stirred gently in order to prevent the pieces from sticking together and forming large lumps. The cubes of curd contract slowly and expel whey. As soon as a considerable quantity of whey is separated from the curd, usually in about 15 or 20 minutes, heating should be started. It is very important to raise the temperature very slowly, at the rate of about 2

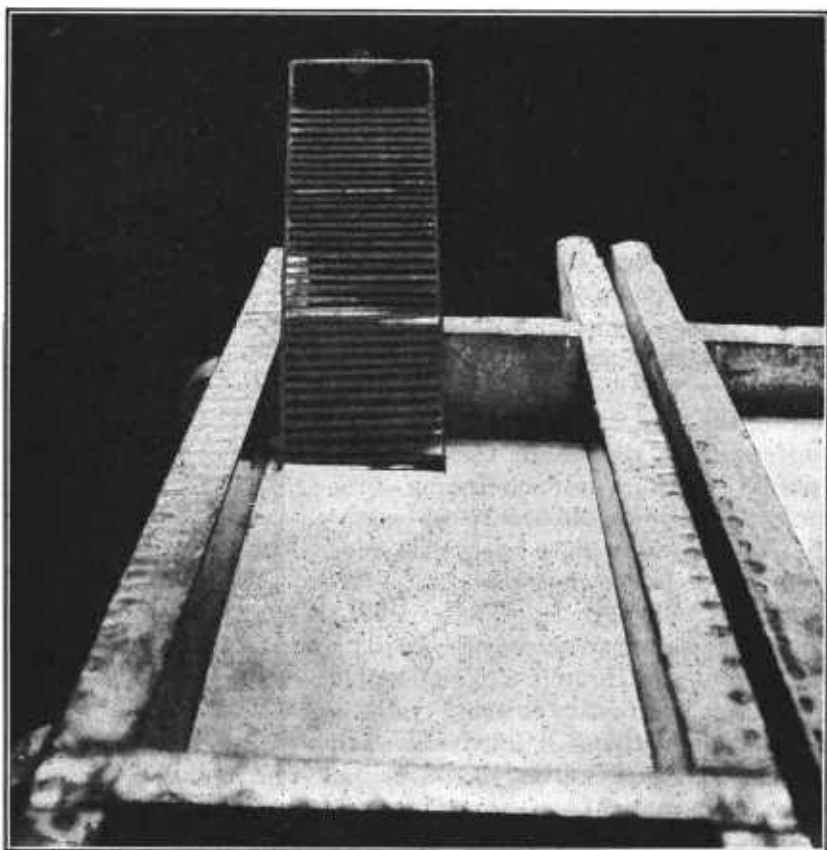


FIG. 5.—Inserting the horizontal curd knife.

degrees in 5 minutes, until a temperature of 100° F. is reached. Various methods of heating the curd may be used. There is less danger of heating too rapidly, however, if some of the whey is dipped out, heated to about 140° F., and gradually poured back into the vat. During the entire heating process the curd should be stirred just enough to keep the small cubes from matting together. The curd should remain in the whey at a temperature of 100° F. until it is firm and is sufficiently acid.

If the cheese is made in a vat or other large vessel it will be found convenient to use a rake for stirring the milk and curd. A rake like the one shown in figure 2 can easily be made at home.

TESTING FOR FIRMNESS.

The proper degree of firmness of the curd may be determined by pressing a mass of it between the hands. If when suddenly freed

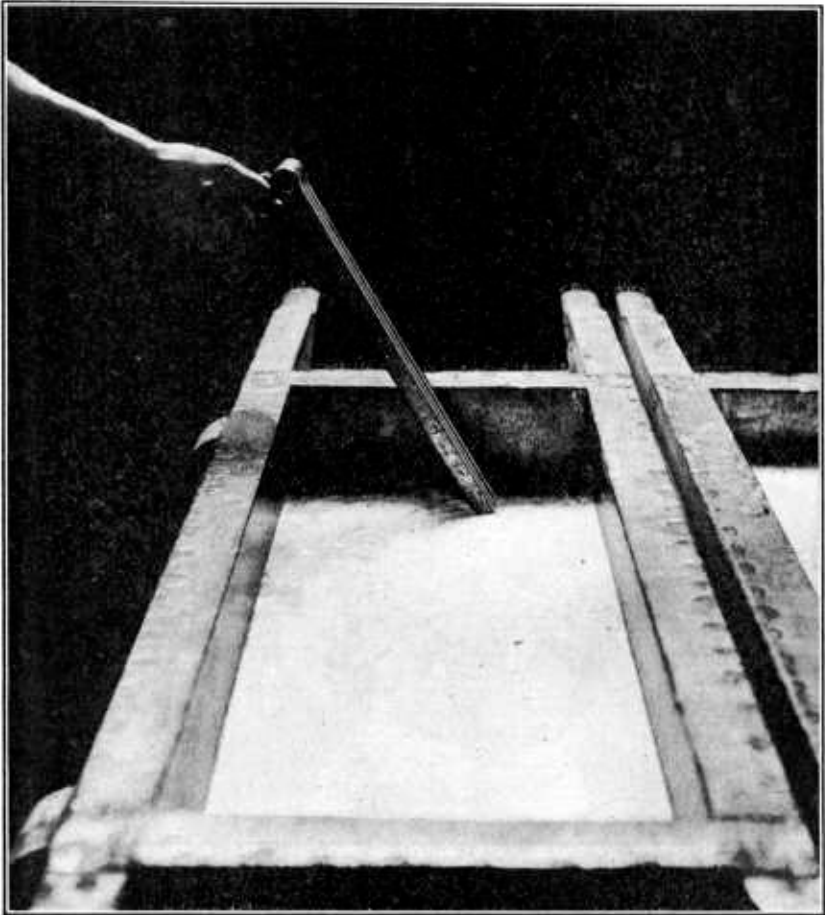


FIG. 6.—Inserting the vertical curd knife.

from pressure the pieces fall apart at once and show no tendency to stick together, the curd is of the proper firmness. (Fig. 7.) At this stage the cubes have contracted to about one-half the size they were when the curd was cut. If the curd becomes too firm, the cheese will be dry and "corky," while, on the other hand, if the curd is not firm enough, the cheese will be soft, too moist, and likely to sour.

TESTING FOR ACIDITY.

The amount of acid which is allowed to develop in the curd before removing the whey is the most important step in the cheesemaking process. The curd while in the whey should be closely watched to prevent the development of too much acid, as a curd that is overacid produces a dry, mealy cheese with a sour flavor, while a curd with too little acid is likely to develop gas and bad flavors during the curing process and does not keep well.



FIG. 7.—The proper degree of firmness in the curd.

The proper amount of acid to develop in a curd before removing the whey may be determined by pressing a little curd in the hand, pressing gently but with increasing firmness for about a minute, or until the particles adhere and moisture is expelled. This piece of curd is rubbed gently on a clean, hot iron until it adheres and is then very slowly and carefully pulled away from the iron. If in doing this fine silklike threads $\frac{1}{4}$ to $\frac{1}{2}$ inch long are formed, the whey should be removed. If threads do not form, sufficient acid has

not yet developed, and the curd should be left in the whey to permit the development of acid. During this period occasional stirring is required to prevent matting. The iron should be just hot enough so that the curd will stick to it and not burn the fine threads. (Fig. 8.)

REMOVING THE WHEY.

As soon as the curd is firm and the proper amount of acid has been developed, the whey should be removed. The curd is allowed to settle, the free whey is dipped off, and the curd is then placed on the



FIG. 8.—The hot-iron test. The curd is ready for pressing when it sticks to a hot iron and is drawn out in threads which break when about $\frac{3}{4}$ inch long.

rack to drain. While on the draining rack the curd should be stirred continuously until all the free whey has escaped; after that it should be stirred every 5 or 10 minutes to prevent it from matting together, and to keep it broken into pieces of the size of a large hickory nut. The curd should be kept warm and as near 100° F. as possible, to permit the development of acid. This may be accomplished by keeping the curd covered with a muslin cloth, and if a jacketed vat is used, warm water may be employed also.

A simple and inexpensive draining box can be made from a wooden box about 2 feet square and 8 inches deep. A close-fitting V-shaped bottom, sloping from both sides toward the center, should be provided. The lower edge of the V-shaped bottom should be on a level with the bottom of the box and the sloping sides should meet the box

sides 3 inches from the bottom, giving a slope of about 3 inches to the center. This provides drainage for the whey which drips from the rack placed above.

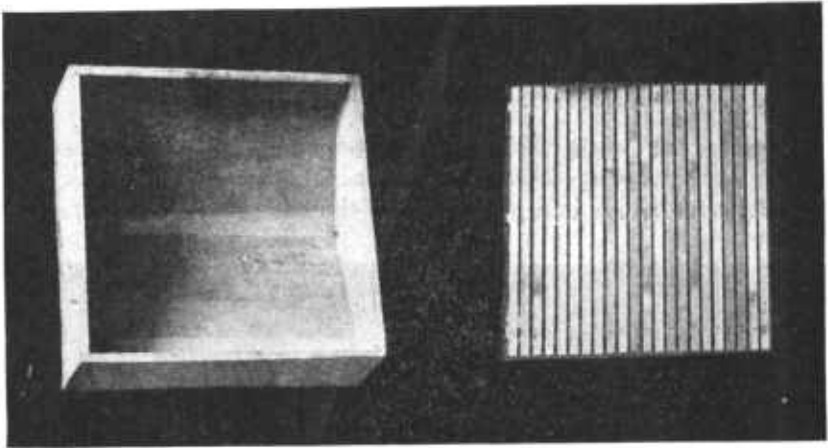


FIG. 9.—Home-made draining box and rack.

The rack is made of slats one-half inch thick and three-fourths inch wide, set one-fourth inch apart and nailed to crosspieces. A three-fourths-inch hole should be made in the end of the drain box near the bottom to allow the whey to drain from underneath the

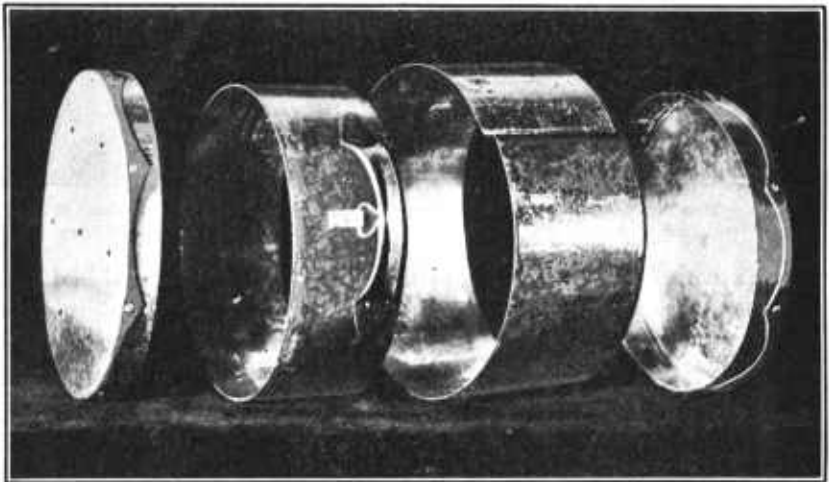


FIG. 10.—Parts of the cheese hoop. Left to right: Top; body, or closed hoop; bandager; bottom.

rack. Before dipping the curd into the draining box a muslin cloth should be spread over the rack to prevent the curd from passing down between the slats.

If only a small amount of cheese is to be made, a large kettle or dish pan may be used for draining the curd. A rack can be made to fit these receptacles, leaving a space underneath the rack which will serve as a reservoir for the whey that drains from the curd.

In case a vat is used for making cheese, no draining racks will be needed. The whey is drawn off through the faucet provided for that purpose. The draining and other operations necessary before the curd is ready to be pressed are completed in the vat.



FIG. 11.—The cheese hoop assembled.

SALTING THE CURD.

The stage for salting the curd is determined by the hot-iron test. When the curd shows fine silklike threads from three-fourths to 1 inch in length when rubbed on a clean, hot iron, the salt should be added. About 3 ounces of salt for each 10 pounds of curd is sufficient. After the salt has been thoroughly stirred through the curd it should be allowed to dissolve and the curd allowed to cool to a temperature of about 85° F. before it is put into the press.

PREPARING THE PRESS AND HOOPS.

A very good cheese press, shown in figure 13, can be made easily and quickly. A hoop or mold for pressing the cheese can be made

from galvanized-metal sheeting, the most convenient size being 7 or 8 inches in diameter and 10 inches in height. A wooden bottom should be made to fit inside the hoop, and a number of $\frac{3}{16}$ -inch holes bored in it to allow the whey to escape.

Cheese hoops may be obtained from dairy-supply houses; the Young America style, making a cheese of from 5 to 10 pounds, is suitable for farm use.

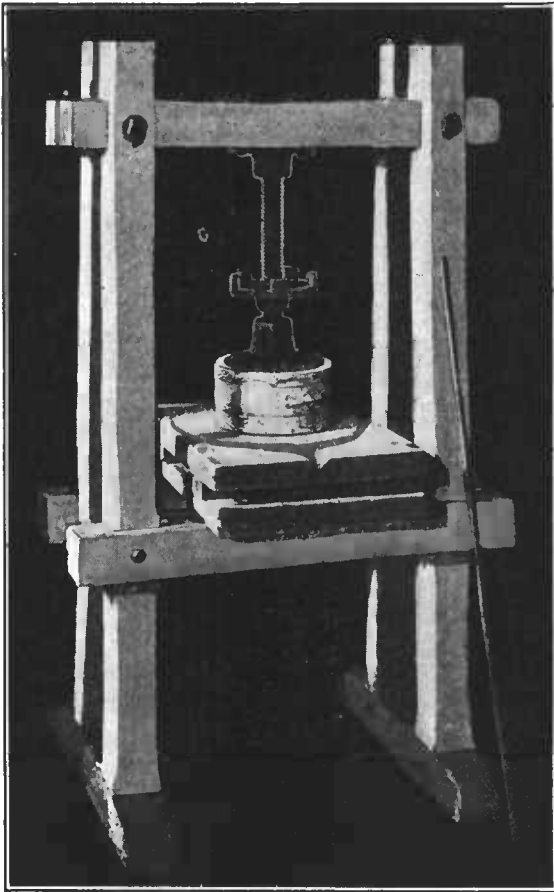


FIG. 12.—Screw-type cheese press.

In order to aid in the formation of a good rind and to improve the appearance of the cheese, a cheesecloth covering is used. Before putting in the curd the hoop is lined with cheesecloth, which is left on the finished cheese.

The cloths for this purpose are of two styles: (1) Circles of the diameter of the cheese for the top and bottom; (2) a bandage made by sewing cheesecloth into a "sleeve" that will fit very snugly into the cheese hoop.

In preparing the hoop for the curd a circle of cloth is placed in the bottom, then the bandage is put in, with the seam on the inside, overlapping on the bottom about 1 inch and extending high enough so that it can be turned over the upper edge of the hoop and held in place.

If a regular cheese hoop is used the bandage should be put over the part known as the bandager and this placed inside the closed hoop.

PRESSING THE CURD.

After the salt is dissolved and the curd cooled to 85° F. it should be put into the hoop and pressed. Pressure should be applied gently at first in order to avoid squeezing butterfat out of the curd. To do this a weight should be placed on the lever of the press about

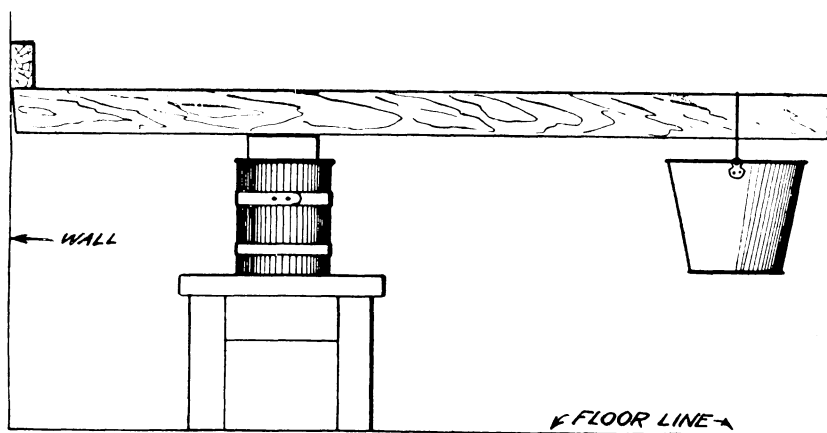


FIG. 13.—Home-made cheese press. The cheese hoop should be placed about 3 feet from the wall. Moving the weight outward on the lever increases the pressure.

halfway between the hoop and the end of the lever, which should be about 12 feet long (see fig. 13). A pailful of stones weighing 35 or 40 pounds makes a suitable weight. After half an hour the weight should be moved to the end of the lever and allowed to remain about an hour. Then the cheese should be taken out and dressed.

DRESSING THE CHEESE.

To dress a cheese it is first removed from the hoop and dipped in warm water; the cloth circles are then removed from both ends and all wrinkles drawn from the side bandages. If the side bandage laps over the ends of the cheese too much it should be cut off, allowing only about an inch lap over each end of the cheese. The end circles are then replaced, using plenty of warm water to insure the

formation of a good rind. The side bandage should not be removed at any time during the curing process. After the cheese has been properly dressed it should be put into the press and full pressure applied for 24 hours.

CURING THE CHEESE.

Curing is an important part of cheesemaking. Both the temperature and humidity should be under reasonable control. If properly ventilated, a cellar is probably the best place, during hot weather, for curing cheese on the farm. If it is desired to cure cheese quickly it



FIG. 14.—The finished cheese ready for the curing room.

may be kept at a temperature of 65° or 70° F., but a temperature of from 50° to 60° F. is regarded as the most favorable. Should mold appear on the cheese, the shelves should be wiped with a dry cloth when the cheeses are turned. If the cheese molds badly, it should be scrubbed with strong brine and placed in a drier curing room. When cheeses are placed in the curing room they should be turned daily until they are paraffined, after which they need not be turned more than twice a week.

PARAFFINING.

The cheeses are paraffined when they are 2 weeks old. Cheese should be paraffined to prevent the cheese from drying too much and

also to prevent molding. A convenient method for paraffining cheese on the farm is to heat the paraffin to a temperature of 240° F., in a receptacle of suitable size, then roll the cheese in the hot paraffin for about 5 or 10 seconds. The cheese is then removed and the top and bottom are dipped. The paraffin must be hot; otherwise the coat of paraffin will be so thick that it will not adhere to the surface of the cheese properly.

Great care should be taken to keep flies from the curing room. All windows should be covered with cheesecloth. Screen wire does not answer the purpose, as the fly which damages cheese by causing skippers is smaller than the ordinary house fly and can easily pass through the meshes of the screen wire commonly used.

Cheese may be cured enough to be eaten when 6 weeks old. The flavor, of course, is then quite mild.

If an even, low temperature is provided for curing the cheese it will cure slowly, and if a sharp flavor is not objectionable the cheese may be kept for many months.

FAST OR SLOW CURING CHEESE.

The manufacturing process and the temperature of curing the cheese may be modified to produce either a fast-curing or a slow-curing cheese.

The following conditions hasten the curing process:

1. A high curing temperature—70° to 80° F.
2. The development of less acid at time of salting (threads of approximately $\frac{1}{2}$ inch by the hot-iron test).
3. Using very little salt.

The following conditions retard the curing process:

1. A low curing temperature—below 60° F.
2. The development of more acid at time of salting (threads of approximately 1 inch by the hot-iron test).
3. Using a large quantity of salt.

Although the amount of acid developed influences the rate of curing, it is inadvisable to deviate from the directions given because of the danger of producing a cheese of poor quality.

SUMMARY.

1. Use clean, sweet milk for cheesemaking.
2. Heat milk to 86° F. Use a thermometer to determine the temperature.
3. Add cheese color if desired, using one-half teaspoon to 100 pounds of milk. Do not use butter color.
4. Add rennet, first diluting it with a pint of cold water. Use one-third ounce (2 teaspoons) to 100 pounds of milk. Stir rennet

in thoroughly, then leave milk and container undisturbed for 30 minutes.

5. Cut the curd when sufficiently firm. Do not crush or break it.

6. Stir the curd gently for 15 or 20 minutes.

7. Heat at the rate of 2 degrees in 5 minutes until the temperature reaches 100° F. Stir while heating.

8. Allow curd to remain in whey at 100° F. until firm and until acid enough has developed. Do not let curd mat together.

9. Sufficient acid has developed when the curd will form strings one-fourth to one-half inch long on a hot iron.

10. The curd is firm enough if a handful of it pressed together between the hands falls apart readily when the pressure is released.

11. When the curd is firm and sufficient acid has developed, draw off the whey and put the curd on a draining rack. Do not let the curd form into pieces larger than a hickory nut. Keep the curd warm while on the rack.

12. When the curd forms strings from $\frac{3}{4}$ to 1 inch long on a hot iron add salt at the rate of 3 ounces for 10 pounds of curd.

13. Have the curd at a temperature of about 85° F.; put it into a hoop, and apply pressure gently.

14. Dress cheese, return it to the press, and apply full pressure for 24 hours.

15. Place the cheese in a curing room at a temperature of between 50° and 60° F.

16. While curing turn the cheese daily for 2 weeks, then twice a week. Paraffin cheese when 2 weeks old by dipping it in paraffin heated to a temperature of 240° F.

PUBLICATIONS OF UNITED STATES DEPARTMENT OF AGRICULTURE RELATING TO CHEESEMAKING ON THE FARM.

AVAILABLE FOR FREE DISTRIBUTION BY THE DEPARTMENT.

Cheese: Economical Uses in the Diet. (Farmers' Bulletin 487.)

How to Make Cottage Cheese on the Farm. (Farmers' Bulletin 850.)

Neufchatel and Cream Cheese. (Farmers' Bulletin 960.)

Trend of the Cheese Industry in the United States and Other Countries. (Department Circular 71.)

FOR SALE BY THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

Varieties of Cheese: Description and Analyses. (Department Bulletin 608.)
Price, 10 cents.

Factors Controlling Moisture Content of Cheese Curds. (Bureau of Animal Industry Bulletin 122.) Price, 10 cents.

