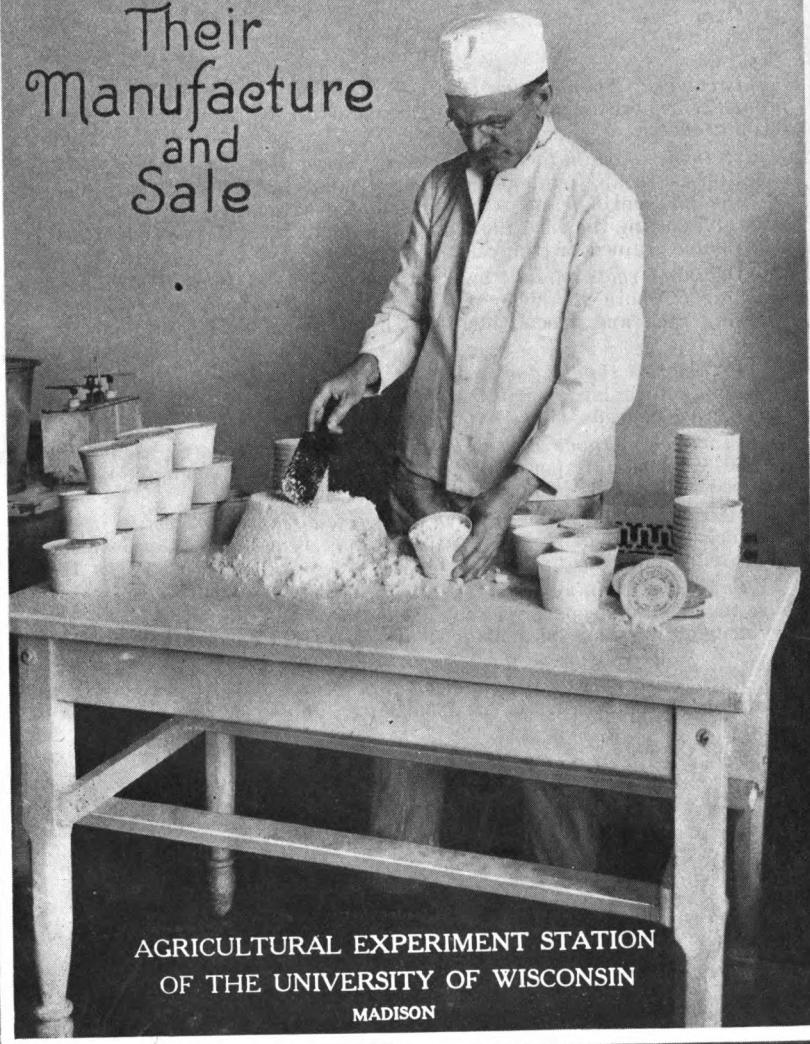
Bulletin 315 June, 1920

Buttermilk Cheese and Cottage Cheese

Their Manufacture and Sale



AGRICULTURAL EXPERIMENT STATION
OF THE UNIVERSITY OF WISCONSIN
MADISON

DIGEST

Creameries should turn skimmilk and butter milk into marketable products. There is an increasing demand for cottage cheese and buttermilk cheese. Page 3.

Methods of manufacturing cottage cheese differ, depending on local conditions. In any method, however, it is advisable to use vats instead of cans for souring, and to pasteurize the skimmilk. In ripening the milk and cutting the curd the aim should be to get a flaky product rather than a fine-grained or pulpy mass. Pages 3-6.

Draining racks should be used to supplement the vat strainer for draining off both the whey and the cold water used in washing. A draining rack and special strainers may be made without much trouble. Pages 6-11.

Creameries should find a market for their product before beginning to manufacture large quantities of cottage cheese. The kind of container used depends somewhat upon the type of market. Page 11.

Practical methods of making buttermilk cheese have been devised at the Wisconsin Experiment Station. Made from good, fresh, clean-flavored cream, it is equal in flavor to cottage cheese. Page 12.

Cheese may be made from ordinary raw-cream buttermilk or from pasteurized milk. A steam-heated container is used and the buttermilk is heated rapidly up to 130° or 140°. Pages 12-14.

Sufficient draining is important in making buttermilk cheese, otherwise the curd will separate in the package and the tub may leak. Cheese drained too dry may be moistened to the desired consistency. Pages 14-16.

Buttermilk cheese finds a good market when it is brought to the attention of the retailer or the consumer. Page 16.

Cottage Cheese and Buttermilk Cheese: Their Manufacture and Sale.

J. L. Sammis

Cottage cheese and buttermilk cheese are profitable side lines for the creamery. There is an increasing demand from the consumer for these appetizing dairy by-products. More efficient creamery management demands that skimmilk and buttermilk be turned into marketable products.

THE MAKING OF COTTAGE CHEESE

Variations in many of the details of manufacture are seen at different factories, depending on local conditions, the amount of help available, and the experience of the maker. Good quality and uniformity of product are always desirable. Speed is especially necessary in some factories and it is always necessary to get the cheese out of the vat in time to receive the next lot of skimmilk from the separator. Some makers find it more convenient to finish the cheese late in the afternoon; others prefer to finish it the next morning. At creameries where the available floor space is limited it is an advantage to drain the curd, salt, and finish the cheese in the vat (see method 3) without the use of a curd rack or cloth. Sometimes an order for cottage cheese must be filled quickly, so that it may be shipped on the next train, and the most rapid methods of handling materials must be used.

Chiefly for these reasons; methods of manufacture differ, and the maker should strive to understand the reason for the results of each method employed, so that he can be successful with any method.

Use Vats Instead of Cans

Instead of souring the milk in cans, it is better to use an ordinary cheese vat, which can be heated by running steam into the jacket. A tall, cylindrical strainer fitting inside the vat next to the gate should be purchased with the vat. In case of necessity, cottage cheese can be made in a container without a jacket, heating the curdled milk by adding hot water to it while stirring with a wooden rake.

The older styles of cheese vats are made with level bottoms and require to be tipped with the gate end down during the draining of

the curd. In the newer vats, the bottoms are made with considerable fall toward the gate end, so that it is not necessary to tip the vat for draining.

PASTEURIZATION IS DESIRABLE

Skimmilk for cheese-making may well be pasteurized, because it makes the product more sanitary and often improves its flavor and keeping quality. Where whole milk is pasteurized before separating, both the cream and the skimmilk are benefited. Much cottage cheese is still made from raw milk at creameries not provided with means of pasteurization. With pasteurized skimmilk, a little more starter may be required for souring than with raw milk, but otherwise the process is the same. For making cottage cheese the pasteurization should be at 145° to 165°, rather than at 185°, since the latter temperature may cause the curd to be fine-grained instead of flaky and coarse.

RIPENING THE SKIMMILK

The skimmilk is run from the separator or the pasteurizer into the cheese vat. If it is planned to make up and pack the cottage cheese on the same afternoon, it is necessary to add from 5 to 10 per cent, or more, of good creamery starter to the sweet milk. If it is desired to make and pack the cheese early the next morning, from 2 to 5 per cent of starter will be sufficient, or perhaps none at all may be necessary.

Pour the starter into the vat through a metal strainer to break up the lumps, stirring the milk constantly. Heat the milk to about 90°* or 100°, or a little lower, cover the vat, and leave quiet until sour and thick.

Over-ripe milk will, of course, need little or no starter. The amount of starter and the temperature used for ripening will be varied by the maker to suit the case. It is desirable to have the milk become sour and thick only a few hours before it is used for making cheese, for with very old, sour material, a disagreeable, rank flavor in the curd is likely to result. With very high acid, the curd breaks into slow-draining, fine powder more readily during the stirring or cutting, and tends to produce a cheese of tough, sandy, consistency.

*All the temperatures given are in degrees Fahrenheit.

The temperature at which the milk is left to ripen is of importance, because if too cold, or if in a cold room, the milk cools down rapidly and the ripening will go on more slowly. Bacteria grow more rapidly at warmer temperatures up to 100°. If the milk is not thick by the time wanted, the next day it should be set at a warmer temperature to ripen, or the vat should be covered so that the milk will not cool so rapidly, or more starter should be added.

The temperature of the thickened milk next morning is of importance because with curd at 65° to 70°, more heating and longer stirring are necessary to heat the curd to the final cheese-making temperature, than if it had been at 80° or 90° when cut. The extra stirring of the cold curd tends to break it up very fine, which is to be avoided if possible. At the Wisconsin Dairy School we prefer to set the milk at 90° to 100° in a warm room or with a vat well covered and protected, so that the curd when ready to cut is at 80° to 90°, thus requiring less heating and consequently less stirring during the heating process, leaving the curd in larger particles or flakes.

CUTTING THE CURD

When the milk is thick and the maker is ready to finish the cheese, the curd may be cut into cubes with cheesemaker's curd knives. Some makers prefer to use a wooden rake, which is moved slowly back and forth through the curd to break it into rather large flakes, but not beat it into a smooth pulp or into fine grains.

While the cheese is being stirred gently but continuously (after cutting with the knives, if used), the steam is turned into the jacket and the material heated to the temperature selected without delay. The stirring must be done gently to avoid breaking up the curd, but continuously to avoid overheating part of the curd on the bottom of the vat, and to keep all parts of the curd at as uniform a temperature as possible. The length of time from cutting until the drawing of the whey may be about an hour, but the size of the curd particles and the temperature to which the curd was heated will largely determine how fast the curd will become firm.

THE CHOICE OF A TEMPERATURE AND METHOD OF HANDLING

The choice of a temperature and method must be made by each cheese-maker to suit his requirements, so that this work will fit in conveniently with his other duties.

Method 1. If after cutting, the vat is heated only to 90° to 94°, the curd is likely to be quite soft after 2 hours' time. If then put on the cloth, it may be left for several hours or half a day to drain and cool before salting, without danger of becoming too dry. This process is slower than method 2.

Method 2. If the curd after cutting is heated to 100° to 105°, it will be firmer at the end of an hour than if a lower final temperature had been used, and it may need to be cooled on the draining cloth by running on a little cold water from a hose. As soon as cooled and drained, the curd is salted and packed.

Method 3. A curd heated to 115° to 120° after cutting will become firm sooner than if at a lower temperature, and in half an hour to one hour's time it is likely to be so firm that immediately after drawing the whey, the curd must be cooled quickly with cold water to 70° or lower, to prevent its becoming too dry and tough. This method is the most rapid, and avoids the use of a curd rack and cloth, since the curd is cooled, drained and salted in the vat. But it requires a supply of cold water in cans, ready for use.

A curd heated to still higher temperatures may become firm so rapidly and need such quick cooling with water that it is difficult to do the work fast enough in a large vat of curd.

DETAILS OF THE DRAINING PROCESS

Before starting to draw whey from the vat, it is always an advantage to push the curd with the rake gently and slowly away from the gate end of the vat, stirring up the curd as little as possible in doing so. Insert the vat strainer above the gate, inside the vat. Let the whey become perfectly quiet, and then open the gate slowly, allowing the clear whey to run out, but not so rapidly as to wash down masses of curd around the strainer and clog it.

In methods 1 and 2, as soon as all the whey is out of the vat that will run out readily, the curd and remaining whey are dipped with a scoop or flat-sided curd pail from the vat to the draining cloth on the rack. A draining rack can readily be made by any handy man or carpenter.

The curd is left on the cloth until the curd is judged to be firm enough for salting, with occasional stirring, if necessary, by lifting the cloth at the corners. By this time the curd should be cool, and if it has not cooled at the temperature of the room, cold water should be run over the curd, stirring it up by hand, so as to cool every part and keep the curd from becoming drier.

HOW TO CONSTRUCT THE DRAINING RACK

The draining rack should have about one square foot of draining surface for each 100 pounds of skimmilk handled or for each 16 pounds of curd to be drained at a time. The area of the bottom may be made about half as large as the bottom of the cheese vat used, and the sides of the rack should be about one-half as high as the vat is deep. To make a draining rack with as little work as possible, take a wooden box about one foot in depth and remove the top and bottom, leaving the sides joined together. For the board bottom substitute a piece of half-inch mesh, galvanized iron wire netting, which may be fastened by means of staples. This rack is set on blocks or short legs to raise it a few inches above the floor, but low enough so that it will pass under the gate of the vat in which the cheese is made. A movable cover is made from the remaining boards.

A more substantial draining rack for use in a large creamery (fig. 1) can be made in this manner: Make a square frame with mortised joints of 2″ x 4″ dressed lumber and fasten the wire net-

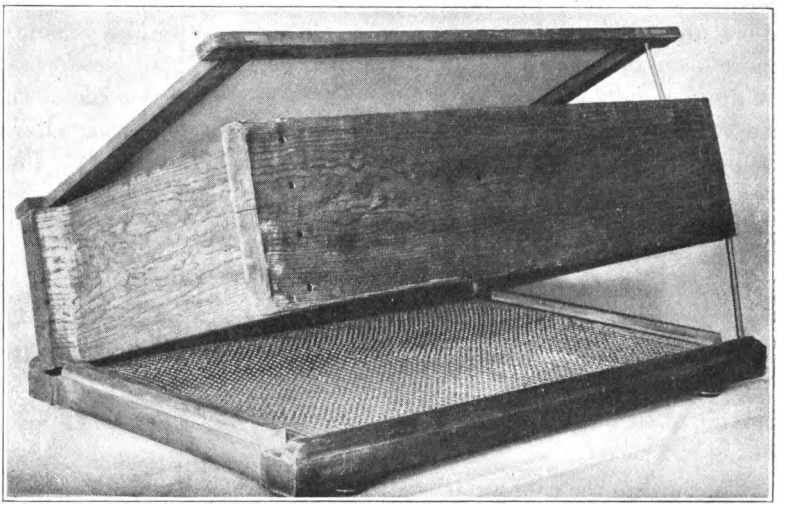


FIG. 1. A DRAINING RACK SUITABLE FOR A LARGE CREAMERY
The rack is shown with the front side raised so that the three essential parts may be seen.

ting on top with staples. This is the bottom of the draining rack. A little strip of molding is put around the outside of this frame on top to prevent the upper half from slipping out of place. The

upper half is made of 2" x 12" dressed lumber mortised and spiked at the corners. A light wooden frame made of 1" by 2" lumber, with muslin or duck tacked on, forms the lid for the draining rack. To prevent the absorption of water the wooden parts should be given two or three coatings of raw linseed oil before they are nailed together. Thus treated, the rack will last several years.

A piece of cheesecloth of good quality is used to cover the sides and bottom of the rack and to hold the curd while draining. If it is necessary to sew two widths of cloth together, lap the edges about one inch, so as to lie flat when in use, and sew two seams about half an inch apart along the lap.

DRAINING THE CURD IN THE VAT

A curd which has been heated to 115° to 120° (method 3) is likely to be so firm in one-half to one hour after cutting that it is ready to drain, cool and salt without further delay. This can be done in the vat, and no draining cloth or rack is necessary. When the curd is well firmed before the whey is drawn it settles well to the bottom of the vat, and stays there, showing little tendency to float down around the strainer and clog it. The firm curd also remains quite open and porous on the vat bottom, permitting all loose whey to drain rapidly out. With the wooden rake, a ditch is made down the middle of the pile of curd, starting from the gate end, which helps to hasten the draining. Very soon after the whey is out, and before the hot curd has had time to become tough, cold water is poured from cans into the vat of curd, in quantity equal to about one-quarter or one-third of the weight of milk used, so as to cover the curd with water. The curd is then stirred well with the rake, teeth down, so as to break up all lumps, and cool all parts of the curd. At the time of drawing the whey, the steam valve for heating the vat should be shut off or disconnected, so as to avoid the leaking of steam into the jacket, and any hot water should be drawn out of the jacket.

The curd in the cold water is allowed to settle and is pushed back from the gate. The vat strainer is inserted and the water drawn off. The curd is ditched down the middle (fig. 2) and it may be stirred somewhat with the rake. The curd drains rapidly and is soon ready to salt. Add one and one-quarter to one and one-half pounds of salt for each one hundred pounds of curd, and stir it in evenly. All this salt should remain in the cheese, which is now

ready to pack. About sixteen pounds of cheese are obtained from 100 pounds of skimmilk. Little or no whey is expelled by the salt.

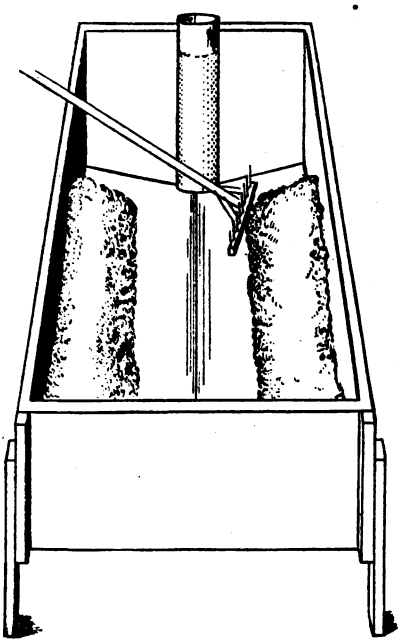


FIG. 2. THE DITCH IS AN AID TO DRAINING
The curd is ditched down the middle with the wooden rake and pushed to the side of the vat and away from the strainer. This allows water to drain away rapidly.

AIDS FOR DRAINING CURD RAPIDLY

When draining whey from a large mass of curd, as when it is made from 2,500 to 5,000 pounds of skimmilk in one vat, the work may be hastened by using a larger draining surface than is afforded by the cylindrical vat strainer. The draining surface may be increased by using a flat strainer of wood or wire netting, or a trough-shaped strainer running the entire length of the vat, putting one of these special strainers in place as soon as the bulk of the whey has been drawn out through the tin strainer and when it begins to clog with curd particles.

Such a special strainer may consist of a board with many $\frac{3}{8}$ or $\frac{1}{2}$ inch holes bored in it, or a frame covered with $\frac{1}{4}$ inch wire netting. The board or frame is made to fit across the bottom of the vat, near the gate. The curd back of it can be stirred with the rake much more effectively than can be done by stirring the curd around the cylindrical strainer by hand.

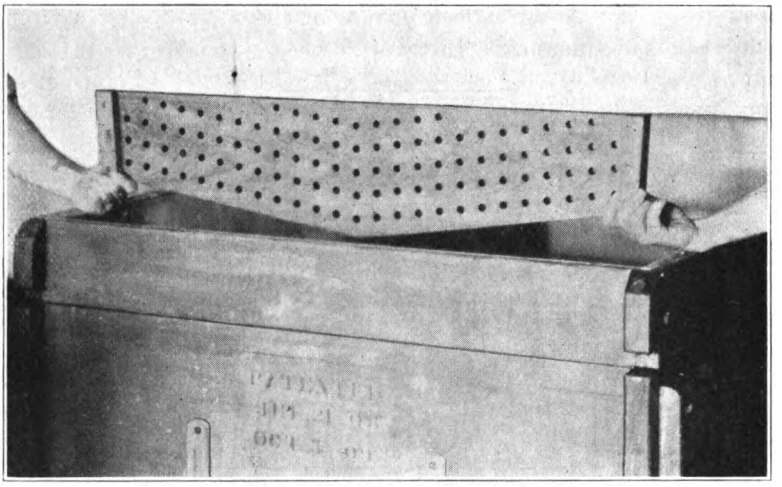


FIG. 3. ADDITIONAL STRAINERS HASTEN DRAINAGE
To increase the draining surface the flat strainer of board with holes bored in it may be fitted across the bottom of the vat near the gate.

With the trough strainer in place, the curd at the back end of the vat drains as rapidly as that near the gate, and the curd on both sides of the trough may be stirred with the rake.

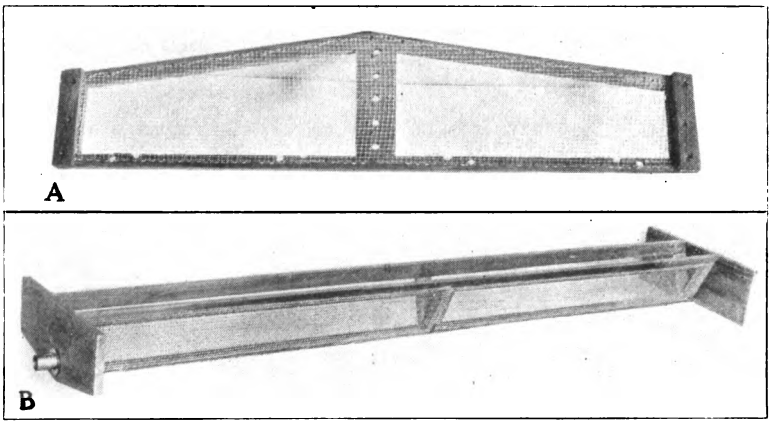


FIG 4. WIRE NETTING ON A FRAME MAKES A CONVENIENT STRAINER
Either the strainer which fits across the bottom of the vat (A) or the trough strainer (B) may be used to supplement the cylindrical vat strainer in draining a large mass of curd.

Any curd drains more rapidly after cooling with cold water than while covered with hot whey, and the final draining off of the cold

wash water (method 3) is usually accomplished much more quickly and completely than could be done in draining off the hot whey. Therefore, when difficulty is experienced in removing the last of the hot whey, the cold water may be added while there is yet considerable whey left on the curd, so as to cool the curd and save time in the final draining.

A fine-grained curd is always more difficult to drain, and care should be used, in stirring curd after cutting, not to break it up into fine, sandy particles.

MARKETING THE PRODUCT

Cheese can be packed in 60-pound tubs with dry liners or in tin cans for shipment; in moisture-proof single service containers for the retail trade; or, more cheaply sold, in thin wooden plates or paper ice cream or oyster pails, if the retailer has time to weigh it out at the counter.

Creameries are advised to find a suitable market for their products before beginning to manufacture large quantities of cottage cheese as it is sometimes hard to sell at a profitable figure.

Cottage cheese in tubs may be cooled to 32° or below, and kept frozen for several months until needed. Mixing in a little fresh cheese when taking out the stored product may improve its flavor slightly for sale to the consumers.

THE MAKING OF BUTTERMILK CHEESE

For many years it was thought practically impossible to utilize pure buttermilk in the manufacture of cheese because of the difficulty of collecting the curd and draining off the whey. These difficulties were overcome by methods devised at the Wisconsin Experiment Station.

Experience with buttermilk cheese has shown that when the buttermilk used is from good, fresh, clean-flavored cream, the flavor of the buttermilk cheese is attractive and equal to that of good cottage cheese.

Skimmilk is usually less than 24 hours from the cow when turned into cottage cheese, while buttermilk from hand separator cream is for the most part, at least 48 or 72 hours old when used for making buttermilk cheese. For this reason, any unclean flavors present are likely to be more highly developed in buttermilk cheese than in cottage cheese under ordinary creamery conditions, and this fact should not be overlooked by prospective manufacturers.

BUTTERMILK CHEESE AND COTTAGE CHEESE COMPARED

Buttermilk cheese is always smooth and fine-grained, so that with the addition of a little water it can be rubbed instantly to a creamy consistency. Unlike over-dried cottage cheese, it can be moistened when drier than desirable by stirring in a little clean, cold water, which will be completely absorbed and retained. The smooth texture of the cheese and its buttermilk flavor give it a rich appearance and quality, and make unnecessary the addition of cream or milk to the finished product.

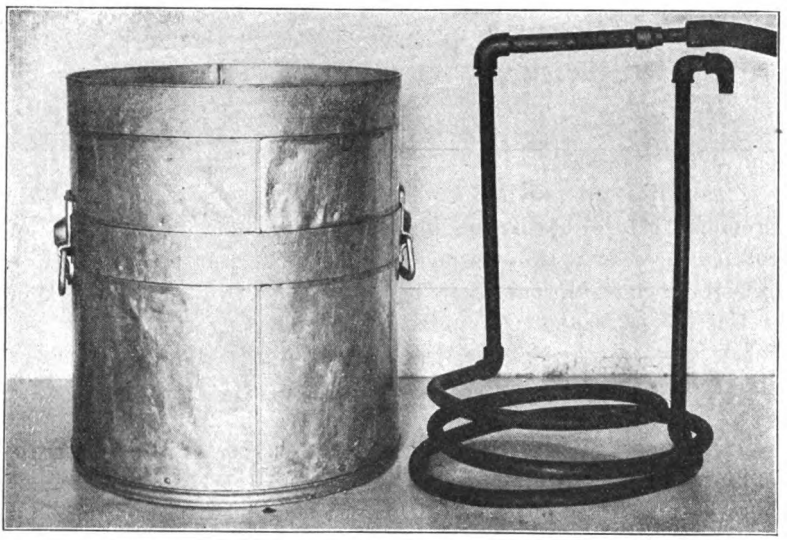


FIG. 5. A CONVENIENT HOME-MADE DEVICE
A milk can may be used for heating the buttermilk and a home-made coil of steam pipes is a great convenience in this process.

In its manufacture the buttermilk is regularly heated for an hour or more to 130° or 140°, or, if preferred, to 150° or 160°. Without producing any undesirable effects upon the texture or moisture content of the cheese, the higher temperature insures thorough pasteurization and the absence of disease-producing bacteria.

CHEESE FROM ORDINARY RAW-CREAM BUTTERMILK

No difficulty will be found in making buttermilk cheese at creameries where the cream is either pasteurized while sweet or not pasteurized at all. The method employed is practically the same as

that used on the farm. The buttermilk is run directly from the churn into any convenient container to which heat can be applied. The wash-water from the butter is not added. A steam-heated cheese vat, cream ripener, or starter can is suitable. A tin-lined cream vat or an old weigh-can may be used, but it will be necessary to provide a heating coil, which may be made of two or three turns of half-inch galvanized or black iron steam pipe. A coil used for heating 150 pounds of buttermilk in a milk can is shown in fig. 5. Any container too heavy to tip to pour out the whey and curd, should be provided with a gate for an outlet.

HEAT THE BUTTERMILK TO 130° TO 140°

As soon as the buttermilk is in the vat, and usually before the butter is salted, it is convenient to heat the buttermilk as rapidly as possible, up to* 130° or 140°, stirring occasionally but no more than necessary to insure even heating. The more gently the material is stirred during the heating the coarser grained the product in appearance.

If the room is very cold, or if preferred for sanitary reasons, the material may be heated to 150° or 160°, without injuring the product or making necessary any other change in the process. After heating, it is left undisturbed for about an hour. During this period, the vat should be covered in order that it may cool as little as possible, for when later put on the rack, the curd will drain faster if warm than if cold.

PUT THE CURD ON THE DRAINING RACK

After the vat has stood for about an hour at 130° to 140° the draining cloth is placed on the rack so as to cover the sides and be located near the floor drain. Upon examination of the vat contents it will be found that the curd has separated from the whey and has collected in a compact mass either at the top of or bottom of the whey (fig. 6). Do not stir the vat contents at this point.

If the curd is floating with clear whey beneath (left, fig. 6), the whey can be drawn out through the partly opened gate into the draining rack and will run through the cloth and the floor drain to the whey tank. As the whey runs out, the layer of curd in the vat settles slowly and, last of all, it runs out through the gate and is

*If sweet cream is churned the sweet buttermilk should be treated with starter, heated to 100°, and left several hours to sour and curdle. It is then heated (see directions given) to 130° to 140° for making the cheese.

caught on the cloth. By this means it is easy to get rid of most of the clear whey first and the curd is put on the draining rack in the form of a thick mush. It is well to set a small pan under the gate on the draining cloth to prevent the curd beating through the cloth at the place where it falls.

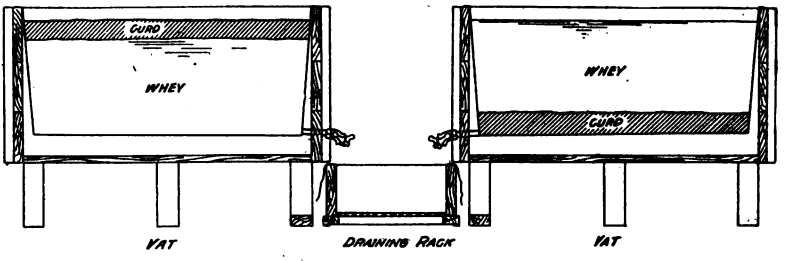


FIG. 6. CURD COLLECTS AT EITHER THE TOP OR THE BOTTOM OF THE VAT

The curd usually floats on the whey (left) but it may settle to the bottom (right), in which case it requires different handling before draining.

In case the curd, after standing at 140° for an hour, has settled to the bottom of the vat (right, fig. 6), it is best to open the gate only part way at first, so as to draw out as much as possible of the clear whey with only a little of the curd. Afterward the gate is opened wide and the bulk of the curd with the small amount of remaining whey is run on to the draining rack. In general, it may be said that curds made from raw cream buttermilk always float at the top of the whey after standing hot an hour. As soon as all of the curd is on the rack, it is covered and left to drain for a few hours or over night.

HOW LONG TO DRAIN CHEESE

An important point in the making of buttermilk cheese is to see that the curd is drained uniformly, so as to be of uniform consistency from day to day. The beginner will do well to examine the curd at intervals after it is placed on the draining rack. The portions of curd nearest the cloth drain most rapidly and may sometimes become quite dry while the top of the curd is still saturated with whey. To hasten the draining, the maker may lift up the cloth at one end of the rack. Slowly lowering the cloth into place again will allow any loose whey to run down over the clean cloth surface and drain through more rapidly. The cloth should be raised at the other end of the rack, also, and the curd rolled into a pile at

the middle. As long as the curd flows like thick mush or mortar when the corner of the cloth is raised, it is too moist to suit the taste of most people.

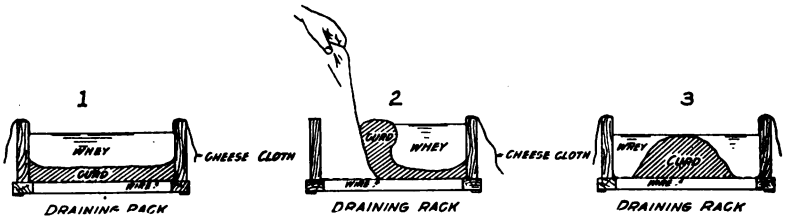


FIG. 7. THREE STAGES OF THE DRAINING PROCESS

At 1 the curd is lying on the cheesecloth in the bottom of the draining rack; at 2 the cloth is lifted on one side to pile the curd in the center of the rack; at 3 the operation is completed. This hastens the draining.

Cheese should always be drained sufficiently before packing, to prevent whey from separating from the curd in the package, or the product leaking out when the container, such as a covered butter tub, is inverted. When properly drained, the mass of curd can be taken out of the draining rack and molded with paddles into a tall form without losing its shape (fig. 8). If drained too dry, it falls apart like damp sand when piled up. It would be much better to drain the curd longer than necessary, rather than not long enough,

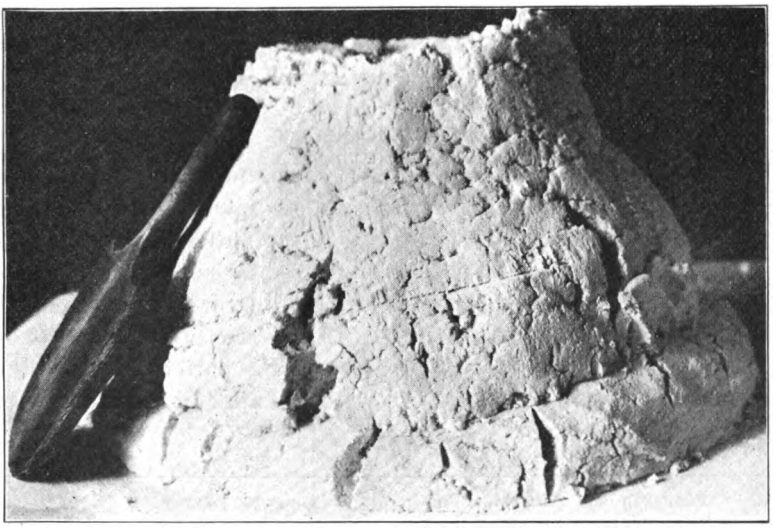


FIG. 8. A MOLD OF BUTTERMILK CHEESE RETAINS ITS SHAPE

Properly drained buttermilk cheese has a fairly firm consistency so that, when turned out of a tub, it will retain its form for a time.

for if the cheese is too dry the maker or consumer may at any time restore the desired consistency by stirring in a little clear, cold water. However, the drier the curd after draining, the harder work it is to stir in the salt. On account of the smooth texture and fine buttermilk flavor of the product, it is not customary for the maker to add any cream to it before packing.

SALTING THE CURD

The curd should be salted and packed as soon as it is properly drained and before it gets drier than is desirable. Use from one and one-fourth to one and one-half pounds of salt for 100 pounds of curd obtained, or for 800 pounds of buttermilk used. Weigh the salt carefully. Break up any lumps. Stir it in well.

FINDING A MARKET FOR BUTTERMILK CHEESE

City creameries which have an ample local outlet for their butter find little difficulty in disposing of buttermilk cheese to their local trade. One firm reports the sale of 28,000 pounds of cheese during one year from their branch creameries in two cities of medium size in the middle west. In every case it is necessary to bring the cheese to the attention of prospective customers, such as storekeepers, factory patrons and residents of the vicinity. Where a perishable product such as buttermilk cheese is offered for sale, it is important that the retailer use attractive window cards for advertising the product to the public so that it may be sold while fresh.

COLORING BUTTERMILK CHEESE

Some kinds of butter coloring impart a faint color to the buttermilk and also to the cheese. If a deeper color is desired in the cheese it may be obtained by adding to the buttermilk before it is heated to 140° cheese color such as is used by makers of Cheddar cheese. One-half ounce or more of cheese color may be used for each 1,000 pounds of buttermilk. If a perfectly white cheese is desired the buttermaker should draw off the buttermilk after the churning and then add butter color to the butter in the churn with the salt.

Published and distributed under Act of Congress, May 8, 1914, by the Agricultural Extension Service, College of Agriculture of the University of Wisconsin, the United States Department of Agriculture co-operating.