Soft Cheese Manufacture

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Chr. Hansen's Laboratory, Inc.
Milwaukee, Wis. LITTLE FALLS N. Y. Toronto, Can.
SOFT CHEESE MANUFACTURE
Cottage Cream Neufchatel

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THE common types of soft unripened cheese with which the American people, as a whole, are most familiar are characterized by a clean, mild, pleasant acid flavor. The kinds which meet with favor are relatively few in number. Cream cheese is the aristocrat of the group. Then follows Neufchatel which is not as rich as Cream cheese but is distinguished by the smooth body which is characteristic of good Cream cheese. Best known probably, of all this group is Cottage cheese whose clean, mildly acid flavor and pleasantly granular body and texture is preferred by many to the smoother, richer cheese. Cottage cheese can be, and usually is, made in every home. Factory methods of manufacture produce this cheese at its best, and its low selling price, its high food value, and its pleasant flavor make it very popular. The preference of the consuming public for a mild, sweet flavored cheese has led to the development of what is commonly called “Rennet Curd” or “Sweet” Cottage cheese. Cottage cheese is closely related to Pot cheese, and to Baker’s cheese since Cottage cheese is Pot cheese or Baker’s cheese to which sweet cream has been added. Pot cheese is the usual type of curd preferred for the manufacture of Cottage cheese, because it is more edible. Baker’s cheese is very popular in some localities but its buttery smooth consistency makes it better liked where it is used as a spread for bread or for cooking purposes.

WHAT EVERY CHEESEMAKER SHOULD KNOW

The successful production of soft unripened types of cheese depends first of all upon the quality of milk from which they are made. Clean sweet milk, free from undesirable odors and flavors, is best adapted to the manufacture of these cheeses.

The factory where the cheese is made must be scrupulously clean if the production of a uniformly high quality of cheese is to be
regularly maintained. All equipment should be of such construction that it can be steamed and scalded. The presence of wood around the floor is not desirable and where wood is necessary in tables, presses, and draining racks, it should be close grained and not porous. Care should be taken to provide facilities for cleaning, scalding, steaming, and drying all equipment whether wood, metal, or cloth with which the cheese or milk comes in contact.

The manufacturing process can be best controlled when the milk is pasteurized at a suitable temperature, usually 140° to 145° F. for 30 minutes. This treatment makes each day’s milk more nearly like every other batch by eliminating practically all of the bacteria which cause defective cheese, as well as those which might produce disease in man. When made from properly pasteurized milk, the cheese, as a rule, is more uniform from day to day; gassy flavors and fermentations due to milk of undesirable quality are eliminated; the yield is usually greater and the keeping quality of the cheese is improved.

Pasteurized milk will not sour rapidly. In the manufacture of cheese the necessary development of acid in the milk is brought about by the addition of cultures of the organisms which produce the most desirable flavor and aroma in the milk. *When cheese is made from pasteurized milk, a good starter is absolutely necessary to obtain a finished product of the highest quality.*

In the manufacture of some of the soft unripened cheese the fat content of the milk should be adjusted to a desired standard before pasteurizing. To accomplish this a means of testing the milk for fat must be available. Knowing the fat content of the milk, cream, and skimmilk available for standardizing, it is not difficult to combine the milk products to obtain the desired fat content.

The procedure is explained in Extension Bulletin 129 published by the New York State College of Agriculture as follows:

“Standardizing milk or cream consists in raising or lowering the fat content to a fixed standard. This is done by adding to the material to be standardized, milk or cream of a higher or lower percentage of fat.

“Draw a rectangle and place in the center of it the percentage of fat desired. Place at the left-hand corners of the rectangle the
percentages of fat in the materials to be mixed. Subtract the number in the center from the larger number at the left of the rectangle. Place the remainder on the diagonally opposite right-hand corner of the rectangle. Subtract the smaller number on the left-hand corner from the number in the center, and place the remainder on the diagonally opposite right-hand corner of the rectangle.

"The two numbers on the right-hand corners of the rectangle represent the number of pounds of material required. If these two numbers are added, they will express the number of pounds of the mixture, which will contain a percentage of fat expressed by the number in the center of the rectangle. In each case the number on the right hand corner corresponds in fat test to the number on the left-hand corner directly opposite.

"How many pounds of 28-percent cream and 3 percent milk will be required to make 500 pounds of a mixture testing 4 percent? In this problem, a definite number of pounds of the mixture is required.

"According to the diagram, 1 pound of 28-percent cream is required to every 24 pounds of 3-percent milk to make a mixture testing 4 percent. This would make 25 pounds of the mixture, but 500 pounds is the amount desired. In other words, the number of pounds desired is 20 times larger than the number of pounds on hand (500 ÷ 25 = 20). The amount must be kept in the proportion of 1 to 24. Therefore, in order to get a 500-pound mixture it is necessary to multiply both the 1 and the 24 by 20. This would give a result of 20 pounds of 28-percent cream and 480 pounds of
3-percent milk, which mixed, will equal 500 pounds of 4-percent milk. Answer.

"This problem may be worked out by simple proportion:

\[
1 : 25 :: X : 500 \\
25X = 1 \times 500 \\
25X = 500 \\
X = 20, \text{ number of pounds of 28-percent cream there will be in the 500 pound mixture. Answer.}
\]

"If there are 20 pounds of 28-percent cream in the 500-pound mixture, the remainder will necessarily be 3-percent milk.

"Therefore, 500 — 20 = 480, number of pounds of 3-percent milk. Answer.

"The number of pounds of 3-percent milk can be found directly by simple proportion:

\[
24 : 25 :: X : 500 \\
25X = 24 \times 500 = 12,000 \\
X = 480, \text{ number of pounds of 3-percent milk. Answer.}
\]

Proof

"In working problems in standardization it is always wise to prove the answer, since this is the best method of checking the work for mistakes. According to the conditions of the problem, there would be 500 pounds of 4-percent milk. This amount of milk would contain 20 pounds of fat (500 \times .04 = 20). According to the results the 500 pounds would be made up of 480 pounds of 3-percent milk and 20 pounds of 28-percent cream. The 480 pounds of 3-percent milk would contain 14.4 pounds of fat (480 \times .03 = 14.4). The 20 pounds of 28 percent cream would contain 5.6 pounds of fat (20 \times .28 = 5.6).

\[
14.4 + 5.6 = 20
\]

"Since the 500 pounds contains 20 pounds of fat, and the materials of which the 500 pounds is made up furnish the 20 pounds of fat, the problem is worked correctly."
Cottage and Pot Cheese

Most cheesemakers add some sweet cream to Pot cheese to improve the flavor. This mixture is marketed as Cottage cheese. Not all Cottage cheese, however, contains sweet cream. It is made from either type of Pot cheese curd or Baker's cheese by adding cream to the curd in quantities sufficient to give the Cottage cheese a fat content of about 3 to 4 per cent. The cream used for this purpose should be rich in fat, clean flavored, and pasteurized.

The Rennet Curd Pot cheese method of making Cottage cheese seems to be gaining considerable favor. When properly made its texture is smooth and free from small hard particles due to the tendency of the rennet to prevent curd breakage. It has a meaty body and mild, sweet flavor and when slightly colored with a good cheese color and creamed, has a decidedly pleasing appearance. The individual curd particles can be distinguished on close examination but they are so soft that the curd is not tough or rubbery. When properly made this cheese deserves the popularity it has gained.

At present there are two methods commonly used in the manufacture of Pot cheese. The essential difference between these two methods is very small. In one instance starter alone is used to bring about the coagulation of the milk; in the other method rennet and starter are both used to accomplish this purpose.

All that has been said about the quality of milk, pasteurization and factors affecting the amounts of rennet and starter applies also to the manufacture of Pot cheese.

First Method--Rennet Curd Pot Cheese

Rennet Curd Pot Cheese should be made from sweet, clean flavored, pasteurized skim milk.

Setting

The cheesemaker attempting to use this process of making Pot cheese will do well to read the list of factors affecting the amounts of rennet and starter to use in the manufacture of Cream and Neufchatel cheese.
The setting temperature should be approximately 72° F. but may be varied providing the amounts of rennet and starter are also varied to meet the altered conditions.

As a general rule when using normal milk of good quality, 1 to 3 c. c. of standard liquid rennet and 2 to 10 pounds of an active lactic acid starter per 1000 pounds of milk will produce a curd ready to cut in 12 to 14 hours. There are so many factors which influence the type of curd that this rule should be considered only a starting point from which the skillful cheesemaker can adjust his setting practice to suit his individual conditions.

Some makers believe that pasteurized milk will not coagulate and so have become accustomed to adding calcium chloride to the milk to replace some of the salts precipitated by the heat exposure. It is a well-known fact that if the milk is not heated higher than 165° F. for an instant in a flash pasteurizer or 145° F. for 30 minutes by the holder method that the addition of acids or salts are not necessary to obtain a proper coagulation of the milk. If the coagulation is too soft or apparently delayed for any reason a little increase in the amount of rennet will usually overcome the difficulty.

Cutting

When the curd is ready to cut, a little free whey will usually appear over the curd which should have an acidity between 0.4 and 0.6 percent. The curd should be firm and jelly-like and should be brittle rather than rubbery at this time.

The cutting should be done with ordinary horizontal and vertical cheddar cheese knives. The size of the cubes of curd should be from 3-8 to 1-2 an inch on a side when cut. The use of the cheddar knives produces cubes of uniform size which lose moisture uniformly. Breaking the curd with a rake produces pieces of curd of irregular size which lose moisture at different rates while the smallest pieces are lost in the whey. The object of cutting is to make possible a rapid loss of moisture from the curd and this loss of moisture will be hastened by cutting the curd into small cubes and delayed by cutting it into large pieces.

Cooking and Stirring

The cooking process should be carefully watched and adjusted. The first step in cooking is to fill the jacket of the vat with water.
at the temperature of the curd and to heat this water to a temperature of not more than 5 to 10 degrees higher than the temperature of curd in the vat. The curd begins to draw away from the sides of the vat soon after the heat is applied. This is accompanied by loss of moisture from the curd in contact with the vat and is an indication to the cheesemaker that the curd can be stirred. The stirring must be gentle to avoid breaking the curd. It can be accomplished by hand, hand scoops or rakes. The temperature of the vat should be raised at the rate of 1 to 2 degrees in 5 minutes, until the curd becomes firm enough to stir without breaking. The stirring should be just sufficient to maintain a fairly uniform temperature throughout the vat and to prevent the formation of masses or lumps of curd. As the curd becomes firmer the rate of heating can be increased.

The cooking and stirring of the curd determine largely the texture of the cheese. The maximum temperature of cooking varies from 95° to 110° F. and the cooking period from 40 to 80 minutes. The cooking temperature is maintained from 15 to 30 minutes after turning off the steam, depending upon the curd, the cooking temperature and the texture desired. High temperature and prolonged heating tend to produce tough, rubbery curd particles which make granular, dry cheese. The lower the cooking temperature the smoother will be the texture of the curd. If the cooking temperature is too low the curd will be mushy.

It is possible, and sometimes very advantageous, to use higher cooking temperatures than those mentioned but the process requires careful handling. As the curd becomes firm the stirring can be made more vigorous.

Rennet action tends to firm the curd so that if this physical characteristic is too apparent the cheesemaker should reduce the amount of rennet used at setting or increase the amount of starter. When the curd is too fragile and breaks too easily after cutting or is not rubbery enough after firming, the starter should be decreased or the amount of rennet increased.

Dipping and Draining

The curd can be dipped when a small portion worked between the thumb and fingers does not go back to milk. A handful or two of curd washed in a pail of cold water will give the operator a
good indication of what the texture of the cheese will be after draining and cooling. Experience alone, however, must guide the cheesemaker at this stage of the process. The cubes of curd should have no soft centers at dipping. Soft centers indicate too rapid application of heat during the cooking operation, or insufficient time in the whey before dipping.

The curd can be drained in the cheese vat or in a draining rack. When the former method is followed a gate strainer should be used to hold the curd in the vat and release the whey. The dipping should be started before the curd is quite firm, in the case of large vats, and the whey should be removed slowly to prevent curd losses. As the last of the whey is removed the curd can be trenched and piled at each side of the vat to facilitate the quick removal of the whey.

A draining rack is usually constructed so that it can be rolled under the gate of the cheese vat. The rack is covered with a cloth which must be kept clean. The cloth should be heavier than ordinary cheesecloth. Some authorities recommend an open weave cloth of heavy body with openings small enough to retain the smaller pieces of curd, but large enough to allow the whey and the smallest curd particles (curd dust) to escape easily. The curd from the vat is allowed to flow into this rack.

**Washing**

Since the presence of free whey causes sour cheese, the practice of washing the curd to remove this whey is beneficial. This washing is usually accomplished in two or three stages. The curd at first is covered with water at a temperature of about 70° F. and drained immediately. The second washing should allow the curd to soak for 5 to 10 minutes with the water at a temperature of 55° to 60° F. The last washing should chill the curd to check the acid development and this wash water can be as cold as 40° F. if the maker finds it feasible to cool his wash water to this extent. During the chilling of the curd it seems to harden in texture. Each piece of curd should retain its identity to suit the general trend of market demand at present. Mushy curd is usually to be avoided.

The curd made by the rennet method will be characterized by a flaky texture which should give an appearance of popcorn
when piled in the vat after draining. The pieces will have shrunk considerably in size from the original cubes.

**Salting**

As soon as the last of the wash water has drained away from the curd, it is ready to salt. Salt should be added to suit the trade demand. One pound of salt for 100 pounds of curd is considered to be light.

The cheese is usually marketed in cheese cans or tubs.

The yield of the cheese depends almost entirely on the dryness of the curd and varies from 13 to 20 pounds from 100 pounds of milk. The factors which affect the yield are:

1. The quality of the milk.
2. The acidity of the curd when cut.
3. The temperature and duration of heating.
4. The amount of draining given the warm curd.

**Second Method—Pot Cheese**

The manufacture of Pot cheese with starter alone as the coagulant requires the use of sweet, clean flavored pasteurized skimmilk. It is commonly made in ordinary cheddar cheese vats.

**Ripening the Milk**

The milk is brought to a setting temperature of about 72° F. and enough starter added to bring about the coagulation of the milk when the cheesemaker desires to work the curd. The amount of starter commonly used varies from 1 to 10 per cent and the setting period from 5 to 16 hours. It is absolutely essential that the starter be of good quality.

**Cutting and Working the Curd**

The curd is ready to cut shortly after the milk coagulates, and when it is of a soft, jellylike consistency. It should be cut as soon after coagulation as the maker is confident that he can work the curd without undue breakage. This curd is more difficult to work than the Rennet Curd Pot cheese because the curd is much more fragile.
The method of cutting is identical with the procedure used in the manufacture of Pot Cheese by the first method. Greater care must be exercised to avoid breaking the curd.

The remaining operations are identical to those already described in the manufacture of Pot cheese when rennet and starter are used to coagulate the milk.
Cottage Cheese Dishes

Cottage cheese when properly prepared will make many economical, wholesome and delicious dishes. In Circular 109 of the U. S. Dept. of Agriculture a number of recipes are suggested which manufacturers and distributors of Cottage cheese might use to good advantage in suitable advertising to stimulate a demand for the product by pointing out these new ways to use it.

**PLAIN COTTAGE CHEESE**

"Cottage cheese may be served plain, as the main dish of a lunch-eon or supper in place of cold meat. Variations: Mix broken nut meats, chopped pimientos, finely cut green peppers, diced cucumbers, or other crisp vegetables with the cheese. Horse radish, onion juice, and parsley make a good combination.

"Season dry cheese rather well, pack into a buttered earthen or enamel dish, chill it, turn it out on a platter, and serve it in slices like cold veal loaf.

"Mix with the cheese a small quantity of leftover ham or corned beef, finely ground, and season the whole with made mustard. Serve this in slices, or turn the mold out on a border of lettuce leaves.

**COTTAGE CHEESE WITH CREAM AND SUGAR**

"Use in place of: Meat or eggs for breakfast or supper.

Variations: Add berries, peaches, or other fresh fruits; canned fruits, raisins, cut dates, or other dried fruits; brown sugar, honey, jam or marmalade, or chopped nuts.

Suggested menu for a summer breakfast: Cottage cheese with cream and fruit (cornflakes if desired); toasted bread; coffee. For a heartier meal, include baked or fried potatoes or a cereal.

**SAUCES FOR CREAMED AND SCALLOPED DISHES**

"Cottage cheese sauces are useful for creaming potatoes, eggs, toast, and leftover vegetables, and for scalloping these and other dishes. The cheese materially increases the protein and lime content of the sauce.

**Proportions for White Sauces with Cottage Cheese**

<table>
<thead>
<tr>
<th>Consistency</th>
<th>Milk</th>
<th>Butter</th>
<th>Flour</th>
<th>Salt</th>
<th>Pepper</th>
<th>Cheese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin sauce</td>
<td>1 cup</td>
<td>1-2 tbsp.</td>
<td>1-2 tbsp.</td>
<td>1-3 tsp.</td>
<td>Dash</td>
<td>1-4 cup</td>
</tr>
<tr>
<td>Medium sauce</td>
<td>1 cup</td>
<td>1-2 tbsp.</td>
<td>1-2 tbsp.</td>
<td>1-3 tsp.</td>
<td>Dash</td>
<td>1-4 cup</td>
</tr>
<tr>
<td>Thick sauce</td>
<td>1 cup</td>
<td>1 tbsp.</td>
<td>2 tbsp.</td>
<td>1-2 tsp.</td>
<td>Dash</td>
<td>1-4 cup</td>
</tr>
</tbody>
</table>

Method of mixing: Make the sauce by any desired method, cook it thoroughly, and cool it slightly before adding the cheese. Stir the
sauce gradually into the cheese till well blended, then re-heat carefully. If the cheese is strongly acid it may curdle the sauce unless the acid is neutralized. Avoid boiling the sauce, for this will toughen the cheese and make it more difficult to digest.

Scalloped dishes made with cottage cheese sauce should be placed in a quick, hot oven so that the crumbs may brown before the sauce boils.

**SCRAMBLED EGGS WITH COTTAGE CHEESE.**

"Proportions: For each egg, use 1 tablespoon milk, 1-3 teaspoon salt, plenty of pepper, 1 rounding tablespoon cottage cheese, pinch of baking soda, fat to grease pan.

"Method: Mix eggs, seasonings, and 1 tablespoon milk for each egg. Scramble eggs as usual in greased pan till entirely cooked. Neutralize acid in cheese with soda, stir lightly into egg. Serve immediately.

**COTTAGE CHEESE SAUSAGE**

1 cup cottage cheese. 1-2 teaspoon powdered sage. 1-2 teaspoon thyme. 1 tablespoon milk. 1 teaspoon salt. 1-4 cup peanut butter, or 2 1-3 teaspoon pepper. 1-3 teaspoon soda. 1 tablespoon finely chopped onion. 1-4 cup coarsely chopped peanut meats. 1 cup dry bread crumbs, or 1-2 cup cold cooked rice, and 1-2 cup bread crumbs. 1-4 cup peanut butter, or 2 tablespoons savory fat. 1-4 cup coarsely chopped peanut meats.

"The bread crumbs may be made from leftover corn, barley or other quick breads.

"Cook the onion in the fat until tender but not brown. Dissolve the soda in the milk and work into the cheese. Mix all other dry ingredients thoroughly with the bread crumbs. Blend peanut butter and onion with the cheese, and mix with them the bread crumbs. Form into flat cakes, dust with bread crumbs or cornmeal, and fry a delicate brown in a little fat in a hot frying pan.

**CHEESE AND POTATO CROQUETTES**

1 cup cottage cheese. 1-4 teaspoon soda. 2 tablespoons chopped parsley. 1-2 teaspoon salt. 1 rounding teaspoon chopped green pepper. Dash of cayenne. Dash of paprika.

"Mix these ingredients very thoroughly and form into small rolls. Then imbed the rolls in mashed potatoes which have been seasoned with salt and pepper, forming a larger roll of each. Roll the finished croquettes in egg and bread crumbs and fry in a pan containing about 1 tablespoon of hot fat, or brush with melted fat and brown in a hot oven.

**COTTAGE CHEESE SALAD**

"Cottage cheese lends itself especially well to salads. If enough is used the salad may serve as the main dish of the meal. French, mayon-
naise and boiled dressings all go well with cheese salad. The cheese may be formed into balls or slices. It may be molded in tiny cups, or passed through a pastry tube.

**COTTAGE CHEESE CLUB SANDWICH**

“This sandwich is made of three good-sized slices of toasted bread, one or more being spread thickly with cottage cheese. Lettuce or watercress and salad dressing are also used. The rest of the filling may be varied to suit the taste or the larder. The sandwich is cut diagonally across, and served on an individual plate with the halves arranged in diamond shape. It is desirable to toast the bread on one side only, and to cut it immediately after toasting, as otherwise the pressure of cutting crushes out the cheese and spoils the appearance of the sandwich. The cut slices may be placed together again while the sandwich is being filled, and the filling may be sliced through with a sharp knife. Variations: In addition to the cottage cheese, these club sandwiches may contain:

1. Tomato, lettuce, mayonnaise dressing.
2. Thin sliced cold ham spread with mustard, lettuce, mayonnaise.
3. Sliced tart apple, nuts, lettuce, mayonnaise.
4. Sliced orange, watercress, mayonnaise.
5. Sliced Spanish onion, pimiento, lettuce, mayonnaise.
6. Two tiny strips of bacon, lettuce, mayonnaise.
7. Cucumber or green pepper, pimiento, lettuce, mayonnaise.
8. Sweet sandwiches may be made with layers of cottage cheese and marmalade, or a paste made of dried fruits. For these the bread need not be toasted, and the lettuce and mayonnaise should not be used.

**COTTAGE CHEESE PIE**

1 cup cottage cheese.  
2-3 cup sugar.  
2-3 cup milk.  
2 egg yolks, beaten.  
1 tablespoon melted fat.  
Salt.  
1-4 teaspoon vanilla.

“Mix the ingredients in the order given. Bake the pie in one crust. Cool it slightly and cover it with meringue made by adding 2 tablespoons of sugar and 1-2 teaspoon of vanilla to the beaten whites of 2 eggs and brown it in a slow oven.—N. Y. State Col. Agr.”
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There are many reasons for the superiority of Hansen’s Rennet and Color of today.

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- Of the same curdling power always.
- Superior in keeping quality.
- Made from the finest rennets.

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CHR. HANSEN’S LABORATORY, Inc.

MILWAUKEE, WIS.

LITTLE FALLS, N.Y.

TORONTO, CAN.
Cream Cheese and Neufchatel Cheese

The chief difference between Cream and Neufchatel cheese is their fat content. The term "Cream Cheese" does not include the type of cheese sold on the market as "Loaf Cream Cheese". Neufchatel cheese is made from milk with approximately 3.5 percent of fat while Cream cheese requires a fat content of about 6 to 9 percent. Homogenizing the milk at a temperature of about 120°F, at 1000 to 1800 pounds pressure tends to prevent loss of fat in the whey. The body of the cheese will be injured if the homogenizing pressures are too high.

Setting the Milk

The milk is coagulated by the action of rennet and acid. The amount of rennet to add to 1000 pounds of milk will vary with:

1. The strength of the rennet.
2. The acidity of the milk.
3. The temperature of setting.
4. The time interval before dipping.

The use of freshly prepared standard rennet extract, high acidity, and high temperature of setting result in rapid coagulation of the milk.

The amount of starter to add to the milk to develop the necessary acidity will vary with:

1. The quality of the milk.
2. The activity of the starter.
3. The acidity of the milk.
4. The temperature of setting.
5. The time interval before dipping.

Milk of undesirable quality, inactive or old starter, low acidity in the milk, low temperatures of setting and short intervals between setting and dipping require the addition of relatively large amounts of starter.

The variations in the amount of rennet and starter required in the manufacture of the cheese can be determined only by experience. With so many variable factors no safe rules can be given to determine the exact amounts of each. In general, however, it
can be stated that when the milk is cooled after pasteurizing to a temperature of 72° F. that 1-3 of an ounce of standard liquid rennet and 4 pounds of active starter are sufficient to set 1000 pounds of normal milk of good quality to be dipped after 12 to 14 hours.

The exceptions to this rule are so many that it is merely a starting point for the cheesemaker to begin trials to determine the exact amounts necessary for the best results under his own conditions of manufacture. His judgment should be based upon certain characteristics of the curd, chief of which are enumerated as follows:

1. The coagulation should be firm and jellylike at the time of dipping. The time of dipping can be varied from a few hours to 18 hours and longer if desired, by increasing or decreasing the amounts of rennet and starter.

2. At dipping, the whey which drains from the curd should contain not less than 0.37 percent of acidity.

3. After dipping, the whey should separate from the curd readily.

The rennet and starter added to the milk each bring about certain characteristic changes in the curd. Milk to which too much rennet or too little starter has been added will show the following characteristics when it should be ready to drain:

1. The curd will be leathery when poured on the draining cloth.

2. The whey will not run through the draining cloth.

3. The curd will stick to the draining cloth and be distinctly lumpy.

4. There will be less than 0.37 percent acidity in the whey.

Too much starter or too little rennet, on the other hand, shows the following characteristics when the curd should be ready to dip:

1. Whey separates before dipping.

2. Usually more than 0.45 percent acidity in the whey.

3. Fast draining of the whey from the curd.

4. Sour curd and cheese.
In handling large volumes of milk a pasteurizing vat with agitators is used for setting the milk. The temperature is easily adjusted in this manner and the rennet and starter easily and thoroughly stirred into the milk. The rennet should be diluted with 40 times its own volume of cold water before adding to the milk, and the starter should be strained to remove all hard particles of casein. The operation of adding starter and rennet is termed “setting”. Both may be added at the same time, although some makers prefer to allow the starter to act for a time before adding the rennet. This is permissable, especially when the milk is very sweet.

After the rennet and starter are added, the milk is drawn from the pasteurizing vat into shot gun cans which hold about 30 pounds of milk. These cans are placed in a room or water bath at the desired setting temperature which may vary from 67° to 85° F. The lower temperatures of setting favor the growth of the starter organisms and 72° F. is commonly used.

Dipping

When the milk has coagulated and the whey, which forms in a hole cut in the curd with a spoon, tests 0.37 to 0.4 percent acidity, the curd is dipped or drained. The time interval from setting to dipping varies usually from 6 to 18 hours.

The dipping of the curd is accomplished by spreading 2 1-2 to 3 foot squares of cotton sheeting cloth on suitable racks and sliding the curd from the shot gun cans into this cloth. The curd should be broken as little as possible in this operation. The racks may be built like potato crates or the cloths may be fastened to draining tables in such a way that the curd from each can is retained in the cloth in which it is placed.

Draining

The curd should be allowed to drain in the cloths until the corners of the cloths can be pulled together to form a bag. This draining period may take as long as 2 1-2 to 3 hours. In the meantime the curd should not be allowed to dry on the edges of the cloths to form hard lumps. If the room is very moist this will not take place. The temperature of the draining room should be kept cool and if the curd is high in acid a handful of salt should be
sprinkled over each 30 pound batch to check the acid development. The following conditions influence the rate of draining:

1. The composition of the milk.
2. The quality of the milk.
3. The amount of rennet added.
4. The amount of acid developed.
5. The temperature of the draining room.
6. The depth of the curd in the cloths.

As the last of the free whey drains away, the curd is scraped from the sides of the cloths toward the center. Three adjacent corners of the cloth are gathered together in the left hand and the fourth corner is twisted around the other three in such a way that all the edges of the cloth are either above or contained in the knot which is formed. The curd should tightly fill the bag thus formed. This bagging operation starts the whey running again. As soon as this flow stops the bags should be piled in single layers in the cheese press and covered with ice to chill them, while the last of the free whey is removed. The whey at this time usually contains about 0.5 percent acidity.

**Pressing**

A good cheese press is one which is easily cleaned. It should be strongly made and capable of exerting a pressure on each bag of at least 30 pounds which should be applied gradually and continuously. It should provide for quick removal of the whey from the curd and should not allow the curd to lay in water or whey even though under pressure.

There is a difference in the action of Cream cheese and Neufchatel cheese during the draining and pressing operation. The high fat content of the former tends to delay the loss of moisture. At the time of pressing the full power of the press should not be applied at first on either type of cheese, but the soft buttery texture of the Cream cheese makes it imperative that the pressure be applied very slowly indeed, until the curd is fairly dry. Excessively high pressure makes the soft curd spray through the mesh of the cloth.

The pressing of the curd is complete when the curd attains the correct dryness. This is evidenced by the body and texture of the curd. If the weight of curd placed in the bag is constant then the moisture content of the curd can be easily controlled by weigh-
ing the bag of curd. Approximately 18 to 20 pounds of curd should be obtained from a setting of 100 pounds of milk for Cream cheese, and 14 to 16 pounds of curd from a setting of 100 pounds of milk for Neufchatel cheese.

**Salting**

The curd after pressing, is removed from the bags and placed in a curd mixer or smoother and worked to a homogeneous, smooth consistency. Salt should be added at the rate of 1 to 2 percent of the curd weight, depending on the trade demand, and thoroughly mixed with the curd.

**Packaging**

Special molding machinery is available which will mold the cheese into cakes of the correct shape and weight and then wrap the cheese in tin-foil without human interference. Less elaborate methods of molding and packaging are common where the curd is hand printed and wrapped. For the more elaborate machines the curd must be handled at certain temperatures and moisture contents for the best results.

The packages of Cream cheese usually weigh about 3 to 4 ounces. Neufchatel packages weigh slightly less. The cheese is usually shipped in cheese cans from the factory to a city where the packaging is done.

**Tables showing the analysis of some samples of Neufchatel and Cream cheese**

<table>
<thead>
<tr>
<th>Number</th>
<th>Water %</th>
<th>Fat %</th>
<th>Casein %</th>
<th>Salt %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>53.52</td>
<td>23.29</td>
<td>19.30</td>
<td>0.49</td>
</tr>
<tr>
<td>2</td>
<td>52.01</td>
<td>24.99</td>
<td>20.75</td>
<td>0.48</td>
</tr>
<tr>
<td>3</td>
<td>45.46</td>
<td>29.90</td>
<td>19.68</td>
<td>1.17</td>
</tr>
<tr>
<td>Average</td>
<td>50.33</td>
<td>26.09</td>
<td>19.91</td>
<td>0.71</td>
</tr>
</tbody>
</table>

**Cream Cheeses**

<table>
<thead>
<tr>
<th>Number</th>
<th>Water %</th>
<th>Fat %</th>
<th>Casein %</th>
<th>Salt %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>44.00</td>
<td>38.60</td>
<td>15.05</td>
<td>0.83</td>
</tr>
<tr>
<td>2</td>
<td>37.57</td>
<td>42.69</td>
<td>16.02</td>
<td>0.55</td>
</tr>
<tr>
<td>3</td>
<td>36.07</td>
<td>47.47</td>
<td>12.73</td>
<td>0.94</td>
</tr>
<tr>
<td>4</td>
<td>30.00</td>
<td>48.00</td>
<td>14.60</td>
<td>1.08</td>
</tr>
<tr>
<td>Average</td>
<td>36.91</td>
<td>44.19</td>
<td>14.60</td>
<td>0.85</td>
</tr>
</tbody>
</table>

*Figures taken from Matheson, K. J.; Thom, C.; Currie, J. N.; CHEESES OF THE NEUFCHATEL GROUP, Conn. (Storrs), Agricultural Experiment Bulletin 78, 1914.
Defects in Soft Cheese*
Their Causes and Remedies.

I. DEFECTS IN FLAVOR.

(a) ACID FLAVORS (indicated by sour taste and smell).

Causes.
1. Too high acid content of milk used.
2. Too long a period from setting to dipping.
3. Too much starter.
4. Too high a temperature of setting.

Remedies.
1. Use of sweeter milk.
2. Dipping of curd when the whey shows from 0.45 to 0.5% acidity.
3. Setting at lower temperature.
4. Use of less starter.
5. Addition of salt to the curd as soon as it is dipped in order to check acid development.

(b) FOOD FLAVORS (characteristic of the foods eaten by cows).

Causes.
1. Access of cows to such foods as turnips, onions, leeks, garlic, weeds, and the like.
2. Exposure of milk in an atmosphere where any of these foods are exposed.

Remedies.
1. Cows must not be allowed to eat the foods named.
2. Aeration with pure air will help to remove odors from the milk.

(c) UNCLEAN FLAVORS (under this head may be included any flavors that are not clean or that are foreign to the cheese and not mentioned above. These flavors may be caused in a number of ways. Only the leading causes are mentioned).

Causes.
1. Use of a starter of bad flavor.
2. Gassy milk.
3. Careless milking.
4. Use of dirty milk cans.
5. Milk not being properly cooled after it is drawn from the cow.
6. Dirty factory conditions.

Remedies.
1. Use of a starter of good flavor.
2. A supply of clean milk.
3. Cleanliness of everything that comes in contact with the milk.
II. DEFECTS IN BODY AND TEXTURE.

(a) DRY AND MEALY TEXTURES (as shown by cheese being too hard, firm, dry and mealy).

Causes.
1. Too little moisture in cheese.
2. Too high development of acid.
3. Use of too much rennet extract.

Remedies.
1. Incorporation of more moisture into the cheese.
2. Prevention of development of so much acid.
3. Use of less rennet extract and provision for a longer coagulation period.

(b) LUMPY TEXTURE (shown by hard lumps of various sizes in cheese).

Causes.
1. Uneven drying of the curd.
2. Too high a temperature during process of manufacture.
3. Too much variation in temperature.

Remedies.
1. Occasional stirring of curd so that it will dry evenly.
2. Even mixing of rennet through the milk.
3. Provision of a room in which the temperature can be controlled.

(c) SOFT, PASTY TEXTURE (shown by cheese being soft and sticky).

Causes.
1. Cheese not sufficiently dried.
2. Pasteurization of milk at too high a temperature.
3. Use of too much cream.

Remedies.
1. More thorough drying of the curd.
2. Pasteurization of the milk at a low temperature.
3. Use of less cream.

*Taken from “Treatise on Soft Cheese from Skimmilk” by W. W. Fisk, Vol. 1, No. 1 Cheese Press, published by Chr. Hansen’s Laboratory, Inc.
Storage of Soft Cheese

During the spring and early summer there is an over production of skim milk. The market which would absorb this milk as cheese, is over stocked when the supply of milk is almost unlimited. During the season of milk shortage the demand for the soft, unripened cheese increases. H. B. Ellenberger of the Vermont Agricultural Experiment Station in Bulletin 213 from that Station suggested a means of putting the surplus milk on the cheese market at a more opportune time. He manufactured soft cheese in 1917 and 1918 and put it in cold storage. Some of his observations on the results of his experiments are quoted:

GENERAL OBSERVATIONS

"When storing soft cheese it is very important that goods be selected which have been properly made and which possess a desirable, clean, mild acid flavor. It is advisable to make the cheese from pasteurized milk. The best results cannot be expected when cheese with off flavors, high moisture, or very high acid is stored. It is also important that the cheese be placed in storage as promptly as may be before any deterioration becomes apparent. It may be better to store it at or near the place of manufacture rather than to ship it a great distance, especially in hot weather when more or less unfavorable fermentations may set in. The cheese may then be removed from storage and shipped to market in a frozen condition if desired. The cheese should not be thawed too rapidly since high temperatures may cause leakage. A poor quality cheese should not be stored; the best should be selected for this purpose.

"That many concerns are beginning to store considerable quantities of cottage cheese is indicated by government reports which show that 54 to 60 storages have reported holdings of 2,000,000 to 3,000,000 pounds on hand each month since last fall.* Some firms store large quantities regularly during the flush season to be disposed of when there is a shortage. These for the most part are concerns which operate creameries. They utilize their surplus skimmilk by making it into cottage cheese and, having more than they can sell fresh, they have conserved the balance by freezing and holding till a shortage appears. Few actually go into the open market and buy for storage, but this can be done successfully if care is taken to secure cheese of proper quality.

"Such plants as make a practice of shipping their cottage cheese in second hand butter tubs or in barrels would incur no extra expense for packages for storage except that such packages should preferably be paraffined and lined.

*This was in the fall of 1918.
SUMMARY

"1. The studies reported upon in this article must not be considered as conclusive although the trials which have been made demonstrate without doubt that cottage cheese may be held frozen in cold storage for several months and come out in condition satisfactory for food and market purposes. There seems to be no good reason why much larger quantities should not be stored during the flush season to be consumed later on during the period of low production.

"2. The cheese held in storage from four to five months from August to the end of December was better in quality than was the fresh cheese then on sale in Burlington.

"3. The cheese which was held in storage for seven and one-half months, from early August until April, developed a decidedly disagreeable flavor though not sufficiently so as to make it unsalable. Whether this resulted from the protracted storage period or from some other cause was not determined.

"4. On the whole the texture of the cheese was but slightly changed by storage except that the Pot cheese was rendered a little more granular.

"5. Tests for acid did not show any appreciable increase during the storage period but the most common criticism of flavor was that a tart high acid flavor had developed.

"6. The Cottage cheese made by the bakers' process held its flavor a little better than that made by the pot method.

"7. The cheese made from pasteurized milk withstood storage slightly better than that made from raw milk.

"8. The cheese which was drained fairly dry scored a little higher after storage than did the cheese which was packed rather wet. This wet cheese leaked somewhat upon removal from storage.

"9. The addition of sweet skimmilk to dry cheese after removal from storage had little effect on the flavor although in some cases it seemed to bring out the tart acid flavor more clearly.

"10. The practice of washing pot cheese curds during draining tends to eliminate taints and reduce acid in the fresh cheese, but the washed cheese deteriorates more during storage.

"11. Pot cheese curds which were chilled before being packed, retained their flavor a little better than the curds which were packed while still warm.

"12. There was apparently no difference in the keeping quality of salted and unsalted curds.

"13. The loss in weight of the storage cheese ranged from less than
one per cent to over eight per cent, the average on 15 tubs being 2.62 per cent.

"14. It seems advisable to paraffine and line, or at least to line, wooden packages in which the cheese may be stored. No lining is necessary in well tinned cans.

"15. The keeping quality of the cheese after removal from storage was nearly though not quite so good as that of fresh cheese.

"16. Neufchatel curd keeps very well in storage but cream cheese tends to develop a metallic and old fat or rancid flavor. Dry Neufchatel curds kept better than those which contained more moisture."
Special Modifications of Soft Cheese

Modified forms of Cream, Neufchatel and Cottage cheese appear on the market, which are simply the cheese curd mixed with some flavoring condiment or pickle and packaged in some desirable form, usually glass jars. These modifications have no better keeping quality as a rule than the cheese which is their basis.

The usual substances mixed with Cream cheese curd are olives, nuts and sweet pickles or relish. Neufchatel may contain any of these substances, or in addition, pimiento or Spanish peppers. Occasionally Neufchatel curd is mixed with mayonnaise as a spread for bread or salad making. Cottage cheese is usually mixed with pimiento and is very desirable for salads when mixed with sweet pickle.

The kind and amount of these flavoring materials which should be added to the cheese curd depends upon their cost, flavor, and the taste of the trade which is to use the product. The substances added to the cheese are usually ground or chopped into small pieces and mixed with the curd at the time of salting. Care must be taken to have the curd dry enough to absorb the free moisture which may be added to it with such flavoring substances as pimiento and mayonnaise.

These special modifications of soft cheese tend to increase the cost of manufacture and the selling price of the product. They are pleasing to the trade as a rule and furnish another outlet for cheese which is manufactured.
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HANSEN’S LACTIC FERMENT contains such species of bacteria as have been proved by years of experience to impart to butter and cheese a good clean flavor, producing a high scoring product. Unlike other cultures Hansen’s, when properly carried, improves in Flavor, Aroma and Vitality in each succeeding propagation. Use Hansen’s Lactic Ferment Culture because it keeps longer (keeps at least 3 months) and does not get overripe in shipment. In manufacturing sweet Cottage cheese, Cream and Neufchatel cheese, a good starter is absolutely necessary to make the best.

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Milwaukee, Wis. LITTLE FALLS, N. Y. Toronto, Can.
A Word to the Prospective Soft Cheese Maker

The manufacture of soft, unripened cheese is not particularly difficult. Certain requirements must be met and certain processes followed and the cheese is almost sure to be good. But the problem of properly marketing this cheese is not always easily or successfully solved.

Soft cheese is a very perishable product, and when not properly cared for will spoil in a few days. This is especially true in warm weather. The spoilage may be due to mold growth or to the development of undesirable flavors caused by the growth of microorganisms in the cheese. Attempts have been made to improve the keeping quality of the cheese by changing the style of package. The use of vacuum sealed glass containers has successfully stopped mold growth but bacterial action can be delayed only by keeping the cheese at cold storage temperatures.

It is believed at present that a market which will consume the output of a soft cheese factory while the product is fresh, is absolutely essential to the successful operation of the business. The cheesemaker who contemplates engaging in this branch of the dairy industry, should consider carefully the marketing as well as the manufacturing problems.
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- Vanilla
- Raspberry
- Orange
- Lemon
- Chocolate
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Junket makes milk into delicious custard-like desserts

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