Manufacture of Cottage Cheese from Nonfat Dry Milk Solids

By W. H. E. Reid and
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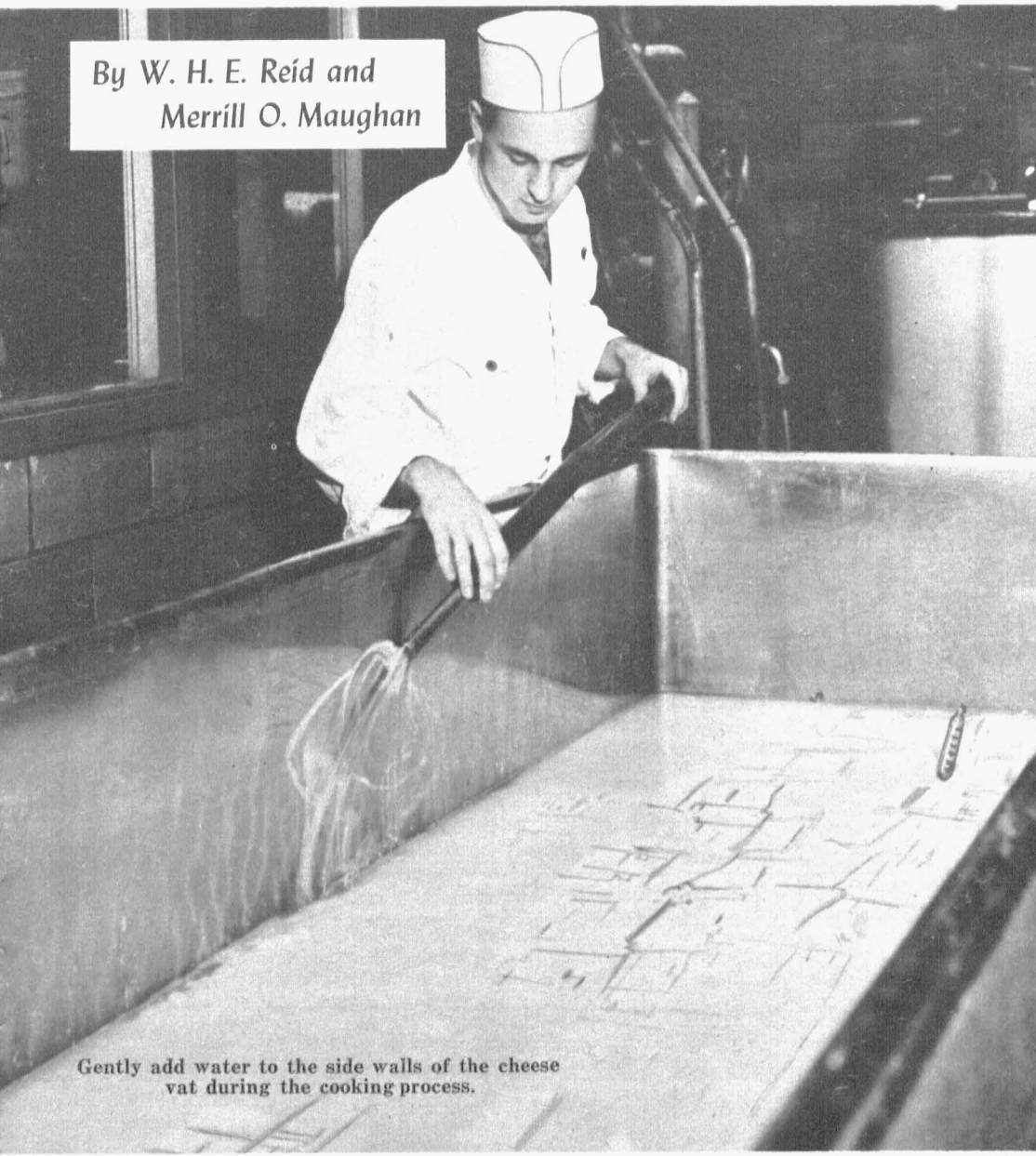

Gently add water to the side walls of the cheese vat during the cooking process.

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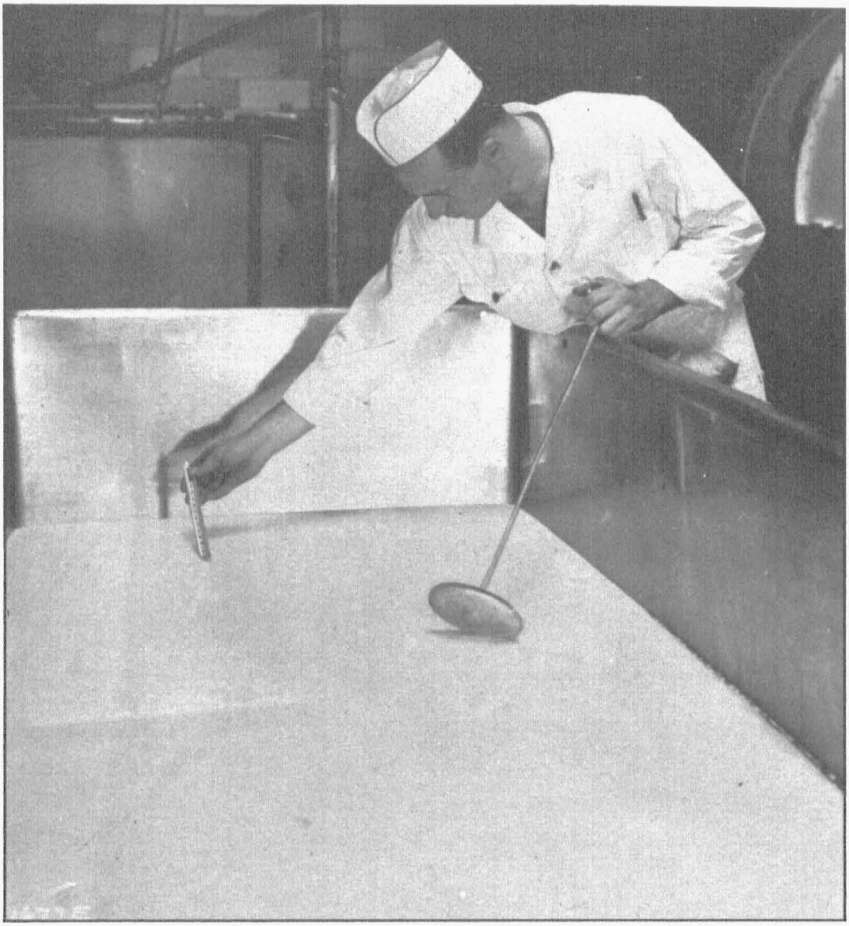

Fig. 2.—A uniform setting temperature is very important. An accurate thermometer is an excellent investment.

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W. H. E. REID and MERRILL O. MAUGHAN*

A new short method of making cottage cheese from dry milk solids has been developed at the Missouri Experiment Station. More than 100 batches of cheese were made, using dry milk from 11 different manufacturers. This was done to test the process with dry milk solids made by various types of spray equipment and in various parts of the country.

After the laboratory work was completed at the Experiment Station the new process was checked on a commercial scale at two Columbia dairy plants. About 325 pounds of cottage cheese were made daily at these plants for ten days. It was made in the same general way that all modern plants make their cottage cheese. It was packaged and sold through both retail and wholesale channels. The product was declared "excellent" or "good" in all cases. As a result of these trials the method has been adopted by many manufacturers.

THE PROCEDURE—IN TEN STEPS

The following is the recommended procedure for the manufacture of high quality cottage cheese from spray process nonfat dry milk solids, using a 20% concentration. That is, 20 pounds of solids to each 80 pounds of water.

(1) Kind of Nonfat Dry Milk Solids to Use

Use only high quality nonfat dry milk solids.

(2) Reconstituting the Milk Solids

Add the milk solids to the water and not the water to the solids.

Since the best temperature for "setting" the curd is from 86 to 90 degrees F., you can save time by using water only slightly warmer than that. Use water at 90 to 92 degrees and you will not need to use the jacket on the cottage cheese vat. Higher temperatures slow down the process of getting the milk solids in solution.

Use 20 pounds of solids to each 80 pounds of water, thereby giving the product a 20% concentration. This is about two and a half times the concentration of ordinary fluid skimmilk.

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(3) Adding the Starter

Add 12% of starter having an acidity preferably of .80% to .85%. This large amount of starter is added to bring about rapid "setting" thereby resulting in a short-time method for making cottage cheese. A short time method has many advantages, hence this procedure.

IMPORTANT: Every cottage cheese authority appreciates the importance of using good starters. The use of high quality milk, thorough pasteurization of the milk, and accurate control of "setting" temperature, are essential in the making of a satisfactory starter.

(4) Adding the Coagulator or Rennet

Add a good "coagulator" immediately after adding the starter to the reconstituted milk in the cottage cheese vat and stir thoroughly.

The amount of coagulator to be added will depend upon the type of coagulator used. It is advisable to add 12.0 cc. of certain coagulators to each 100 pounds of reconstituted milk. When using rennet, 1.2 cc. of rennet to each 100 pounds of reconstituted milk seems advisable.

(5) "Setting" Procedure

Let "set" until ready to cut.

The time required for "setting" will be about three hours under this short-time method of manufacture. Some brands of milk solids required only 2½ hours, other brands required as much as 3½ hours for best results.

To determine the proper time to cut the curd insert a dairy thermometer into the curd and force the thermometer forward. (Fig. 3.) If the curd "splits clean" in front of the thermometer, then the curd is ready for cutting. Experience will help you recognize this condition.

Some cottage cheese makers give great emphasis to the acidity of the curd as being the best indicator of the proper time to cut the curd. However, our research studies show that acidities are sometimes as low as .60% when this proper point has been reached. In some instances the acidity has reached as high at .90%.

However, with added experimentation on any one particular brand of milk solids over a longer period, probably an ideal acidity point can be determined for that particular brand which the cottage cheese manufacturer would want to use as his individual guide.

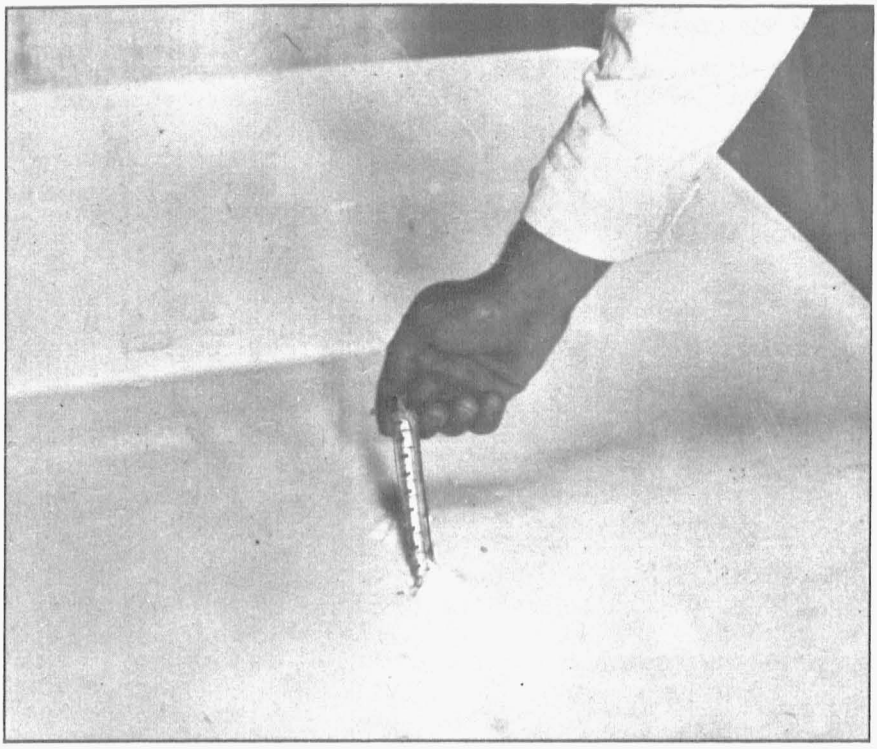

Fig. 3.—As the thermometer is pushed forward, if the curd "breaks clean" it is ready for cutting.

(6) Cutting the Curd

Cut curd in the usual manner and allow it to stand for 60 minutes. Allowing the curd to stand for about one hour after cutting gives time for the whey to separate from the curd and for the curd to begin to "firm up".

In our research studies, we attempted to cook the curd immediately after cutting, and then again we have waited as long as three hours before beginning the cooking procedure, but the most satisfactory time seems to be approximately 60 minutes. When using certain brands of dry milk solids, good results were obtained by beginning the cooking procedure within 15 to 30 minutes after the curd had been cut.

(7) "Cooking" the Curd

(This is a very important step and care must be experienced to avoid breaking the curd. Best results are obtained when cooking is done *very* slowly and *very* gently.)

Cook for 60 to 105 minutes, namely 1 to 1¾ hours, as follows:

a. First, add water having a temperature of 120 degrees F. directly against the inside walls of the cottage cheese vat. (See cover page photograph.) The amount of water added at this temperature should be equivalent in volume to approximately one-third of the amount of curd and whey already in the vat.

b. Slowly raise the temperature of the water in the jacket of the vat to 120 degrees F.

c. Add additional water having a temperature of 120 degrees F. against the inside walls of the cheese vat. Add about as much water at 130 degrees F. as was added at 120 degrees F.

d. Then add water at 140 degrees F. against inside walls of the vat, using an amount sufficient to raise the entire temperature of the contents of the vat up to 120 degrees F.

e. At the end of 30 minutes, stir the curd very gently using a cottage cheese scoop. By moving the cottage cheese scoop directly across and on the bottom of the vat, the cottage cheese particles will be flocculated and thereby prevent matting.

f. At the end of 45 minutes, and again 15 minutes later, carefully stir the curd once (once only). Using the same cottage cheese scoop, this time pull the scoop towards you. In this way the cottage cheese particles are moved from the opposite side of the vat to the side nearest you and will again flocculate or separate all the cottage cheese particles and in this manner they are heated uniformly.

g. At the end of 60 minutes, again stir the curd.

h. Thereafter, gently and slowly stir once each five minutes until the curd is sufficiently cooked or firmed. Slow cooking of the curd and care in stirring will prevent breaking the curd. (Fig. 4.) It will be necessary to add more water against the inside walls during the cooking process to keep the temperature at or very close to 120 degrees F. through the entire cooking process.

To determine when cooking is completed, experience again is very valuable. A common test to use while the curd is firming is to put a few cottage cheese particles in a bottle of cold water and shake. If they stand up without breaking, then the cooking process has gone far enough.

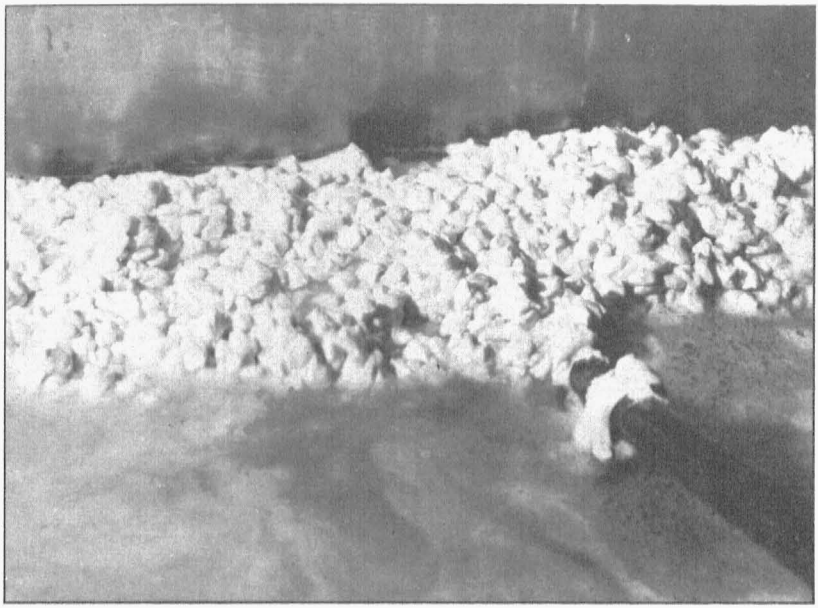

Fig. 4.—Slow cooking and gentle stirring are necessary in making firm and evenly textured cottage cheese.

(8) Draining Whey and Washing Curd

Drain off the whey. At the same time, however, as the whey is being drawn off, it is very important to add cold water at the opposite end of the vat. This makes the cooling of the curd gradual and helps to float the curd. If all of the whey is drained off before any water is added, the cold water may cause the warm curd to mat together.

Continue to wash the curd gently and thoroughly until the acidity of the wash water is down to a point ranging between .02% and .06%.

(9) Determining Yield and Storing the Cheese

Weigh the cheese to determine the yield. Next place the cottage cheese in clean cans free from rust and cover with cold water. (If you wish to prolong the keeping quality of the cheese 5 ounces of salt may be added to each 20 pounds of water used.) Then place the cans of cottage cheese in a storage room at 40 degrees F.

Storage water should be changed frequently, at least once every three days, and preferably more often as a means of prolonging the keeping quality of the cottage cheese.

(10) Creaming and Salting the Cheese

When the cottage cheese is removed from storage, drain thoroughly. Then add cream and salt to suit the taste of the consumer and

to meet the standards you have adopted for your high quality cottage cheese. (Fig. 5.)

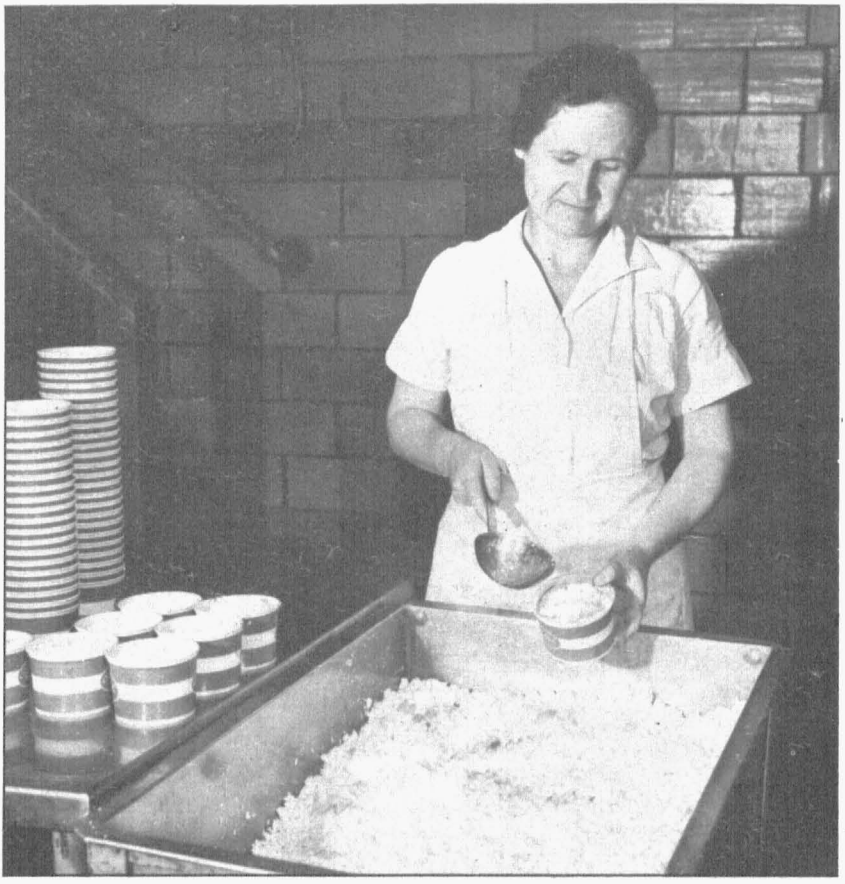

Fig. 5.—This cheese has uniform texture and the desired firmness.

Cottage cheese offers wonderful possibilities, since it is an excellent source of protein, and is economical and highly nutritious.