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Utilization of Surplus Milk in the Small Dairy Plant: 4. Stirred Curd Types of Cheese

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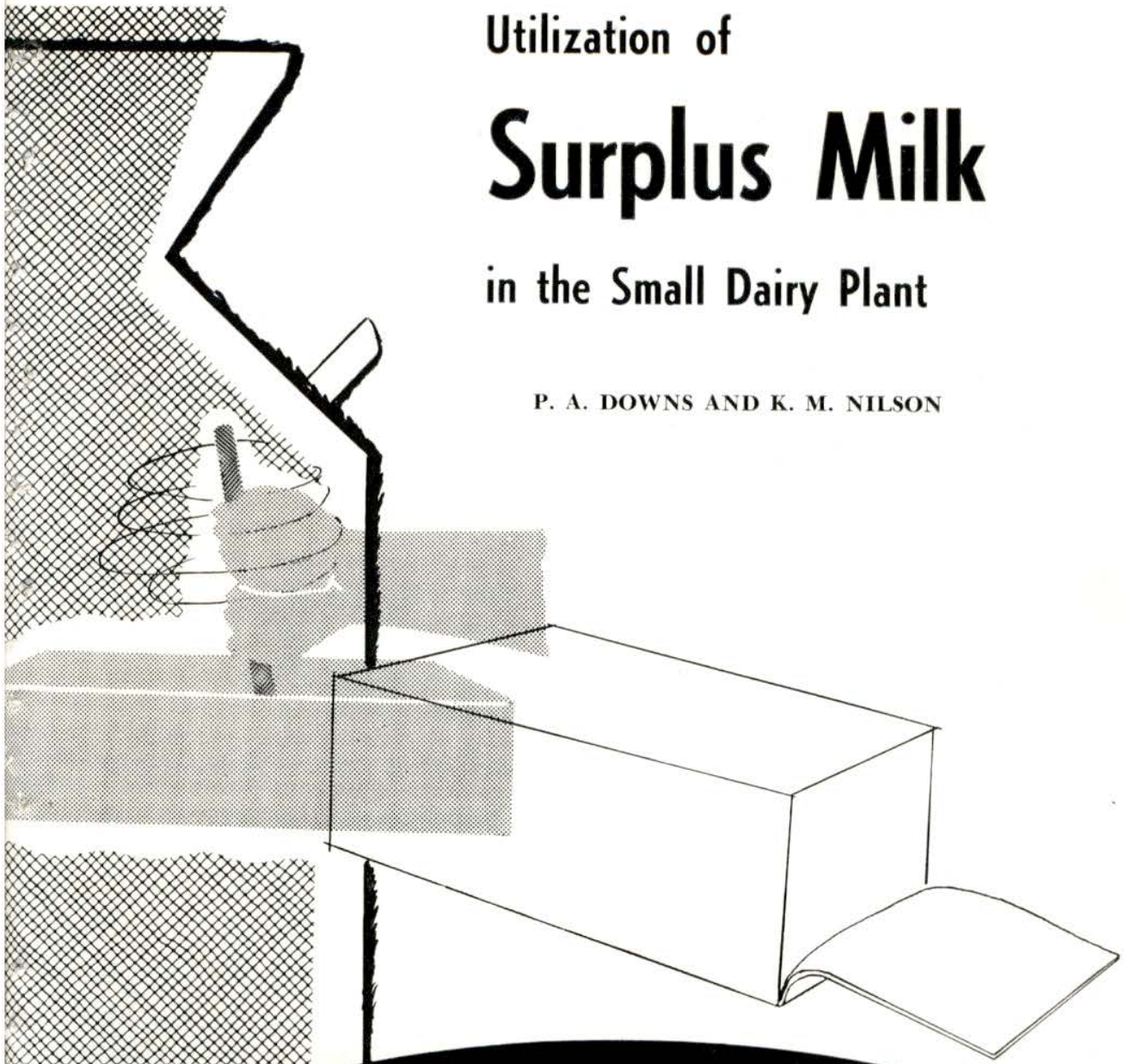
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Utilization of **Surplus Milk**

in the Small Dairy Plant

P. A. DOWNS AND K. M. NILSON



4. Stirred Curd Types of Cheese

FOREWORD

In this series of publications an effort is made to describe how a variety of products can be prepared in plants where surplus milk is a problem. Each type of product is described in detail, methods of manufacturing are outlined, and the equipment and supplies needed are listed. As far as possible similar equipment is used for several products.

In this publication the preparation of a group of stirred curd types of cheese is presented.

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Utilization of Surplus Milk in Small Plants

IV Manufacture of Stirred Curd Types of Cheese

P. A. Downs and K. M. Nilson¹

INTRODUCTION

IN the farm homes of the early Eastern colonists, cheese was made by a practice brought from England known as the stirred curd, or granular, method. This process of making cheese differs from the cheddar process in that the curds are not allowed to mat and therefore milling is not necessary.

This method was widely used in the early farm dairies before development of the cheese factory.

During the process considerable labor is required to keep the curd from matting after the whey is drawn and the curd cooled. The system has been replaced in the factory by the cheddar process, probably because of the hand labor factor. The development of proper power equipment, however, has kept a small amount of this type of cheese on the market.

This method produces a cheese with an open body and can not be classified as Cheddar cheese. This method is also used in the production of other special cheese types, such as Husker, described by this station in 1942 (1).

No doubt the practice of matting, cheddaring and milling the curd offered the cheese maker better control of gassy curd in the days of raw milk cheese. However, today with pasteurized milk the danger of gassy cheese can be largely ignored even when the shorter stirred curd or granular process is followed. This shorter method eliminates the cheddaring process and the use of the curd mill, making necessary one less piece of equipment in the plant. It offers a possible way of utilizing surplus milk.

The object of this publication is to furnish information which will enable you to produce three granular or stirred curd type of cheeses.

The Food and Drug Administration (4) describes three kinds of cheese in this group—Granular, Colby and Edam. Table 1 shows the minimum percentage of fat and maximum moisture content allowed in each.

EQUIPMENT NEEDED

No special equipment is needed for making stirred curd cheese. A cheese vat, curd knives, and other small equipment used in making cottage cheese is satisfactory. The Wilson type cheese hoops and

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Table 1. Information on Stirred Curd Cheeses.

Name	Composition		Yield of Cheese per 100 lb. milk	
	Fat*	Moisture**	Fat in milk	Pounds of cheese
	<i>Per cent of solids</i>	<i>Per cent</i>	<i>Per cent</i>	
Granular	50	39	4.0	10
Colby	50	40	4.0	10
Edam	40	45	3.0	8.5-9.0

* Minimum

** Maximum

packaging materials previously listed in Circular No. 100 (2) are needed.

GRANULAR CHEESE

This cheese is made by the stirred curd process. Its fat content cannot be less than 50 per cent of the total solids and its moisture not more than 39 per cent. The curd is salted and packed without washing. It is a rapid curing cheese with an open body and pleasing flavor.

Manufacturing Procedure

Fresh pasteurized or raw whole milk is placed in the cheese vat at a temperature of 86°-88° F. (approximately 10 pounds of milk for each pound of cheese desired).

If the milk used is not pasteurized, the cheese must be cured at a temperature of not less than 35° F. for not less than 60 days.

A freshly coagulated lactic starter is added at the rate of 1 per cent of the weight of the milk, and mixed well by stirring.

Rennet extract at the rate of 3 to 4 ounces per 1,000 pounds of milk is diluted in 10 volumes of cold water. The diluted rennet solution is quickly stirred into the milk. Stirring is stopped, the vat is covered and the milk left to coagulate undisturbed for 30 minutes. After 30 minutes the coagulated milk should have a curd that will break clean when a thermometer is put into the curd and gently lifted.

With the curd in this condition cut it lengthwise with the horizontal knife and then lengthwise and crosswise with the vertical knife. This operation produces separate cubes of curd which will float in the whey. At this time the titratable acidity of the whey should be from .10 to .11 per cent.

After cutting is completed and before heating gently stir the curd for five minutes. Heat should be applied to raise the temperature one degree every four to five minutes, or from 86°-88° F. to 98°-100° F. in approximately 60 minutes.

Continue stirring the curd for 30 minutes after the heating has been completed. The temperature should remain at 98°-100° F. At

the end of this time the acidity in the whey should have increased approximately .02-.03 per cent from the time of cutting.

Now drain the whey, keeping the curd stirred to prevent matting. This will require close attention for 15 minutes during which time most of the whey should drain freely.

When the whey has drained for approximately 15 minutes, salt the curd at the rate of four pounds of salt to each 1,000 pounds of milk. Continue stirring for another 30 minutes at which time the curd is ready to be placed in the hoops.

The two and one-half to three hours required to make this type of cheese is approximately one-third the time required for making cheddar cheese, and offers an opportunity to put away surplus milk for later sale in the form of cheese with a minimum expenditure of time.

Table 2. Typical Time Schedule for Granular Cheese.

Step	Time Minutes	Temperature Degrees	Acidity Per cent
Milk in vat	0	86- 88	.16
Starter added	0	86- 88	.17
Rennet added	30	86- 88	
Cut	60	86- 88	.105 whey
Heat on	65	86- 88	
Heat off	125	98-100	
Whey off (start)	155	98-100	.125-.13 whey
Stir curd	170	90	.22 -.30 whey
Salt	175	90	
Hoop	205		

COLBY CHEESE

This cheese is a slight modification of the granular or stirred curd process and is defined by the Food and Drug Administration (4) as being made by a similar process with part of the whey being drained off and the curd cooled by adding water, the stirring being continued so as to prevent the pieces of curd from matting. The curd is drained, salted, further drained and hooped, as in granular cheese. It must contain not more than 40 per cent of moisture and its solids content be not less than 50 per cent milk fat.

The requirement for raw milk cheese and curing are the same as for granular cheese.

If cheese is made as stated it should be labeled as Colby Cheese.

Manufacturing Procedure

As stated in the definition, Colby Cheese differs from the granular cheese in that it contains more moisture when finished.

The higher moisture content is obtained by cooling the curd in the whey before it is drained. This is done by adding cold water to the vat after one-half the whey has been removed. Add enough water to reduce the temperature of the curds and whey to 80° F.

When this is accomplished the whey and water are removed and the curd stirred until drained. It is then salted, stirred and hooped as outlined for granular curd method.

Colby has a softer body, contains more moisture and has a more open texture than cheddar or stirred curd cheeses. For these reasons it does not keep as well as cheddar and should be marketed soon after the desired flavor has developed.

Table 3. Typical Time Schedule for Colby Cheese.

Step	Time Minutes	Temperature Degrees	Acidity Per cent
Milk in vat	0	86- 88	.16
Starter added	0	86- 88	.17
Rennet added	30	86- 88	
Cut	60	86- 88	.105 whey
Heat on	65	86- 88	
Heat off	125	98-100	
1/2 whey off	155	98-100	.125-.13 whey
Water added	165	80	
Whey off	225	80	
Stir curd	230	80	
Salt	235	80	
Hoop	255		

EDAM CHEESE

This cheese, while originating in the vicinity of Edam in the Province of North Holland, Netherlands, is often made in the United States. It is of the stirred curd type and is commonly made in a ball shape weighing from 3½ to 4½ pounds.

Edam cheese is made from low fat milk and is defined by the Food and Drug Administration (4) as containing not more than 45 per cent moisture, and its total solid content not less than 40 per cent milk fat.

If the milk is not pasteurized, the cheese so made is cured at a temperature of not less than 35° F. for not less than 60 days. It is made in ball or loaf shapes, and the surface is covered with red-colored paraffin or other tightly adhering coating colored red.

Manufacturing Procedure

Freshly pasteurized or raw milk containing 2.5 to 3.0 per cent fat is placed in the cheese vat at a temperature of 86°-88° F. (Approximately 11 to 12 pounds of milk for each pound of cheese desired.)

Add a freshly coagulated lactic starter at the rate of one per cent of the weight of the milk and mix well.

Add cheese color at the rate of two ounces for each 1,000 pounds of milk and stir the milk well.

Then add rennet extract at the rate of five ounces for each 1,000 pounds of milk after the rennet has been diluted with ten volumes of cold water. The rennet solution should be stirred quickly into the

milk. Cover the vat and leave undisturbed for 20 to 30 minutes to coagulate.

When the curd breaks clean over a thermometer cut it as outlined for granular cheese except that you should continue cutting until the curd particles are about the size of tapioca or wheat kernels (Plate 1). At this time the titratable acidity of the whey should be from .10 to .11 per cent.

Shortly after completing the cutting (about 15 minutes) heat the curds and whey to 96° to 98° F. in 30 minutes.

After approximately one-half the whey is removed, add six pounds of salt for each 100 pounds of milk used (Plate 2). Allow the curd to settle, draw the whey and place the curd in the hoop.

For the small plant the Wilson type 20 pound hoop is satisfactory. Follow packaging, labeling and curing suggestions as for Colby and Granular type cheese.

The salted curd from any of the three types, without additional flavor, makes a very desirable product when cured to the degree that pleases the consumer. Such curing usually requires from three to six months. If it is offered for sale before a pronounced cheese flavor has developed it will be relished by those who like a mild flavored cheese. If it is cured until a snappy cheese flavor has been developed it will be relished by those who like a well aged cheese flavor.

Table 4. Typical Time Schedule for Edam Cheese

Step	Time Minutes	Temperature Degrees	Acidity Per cent
Milk in vat	0	86-88	.16
Starter added	0	86-88	.17
Rennet added	0	86-88	.17
Cut	30	86-88	.11 whey
Heat on	45	86-88	.11 whey
Heat off	75	96-98	.13 whey
½ whey off	80	96-98	.13 whey
Add salt	85	96-98	
Hoop	90		

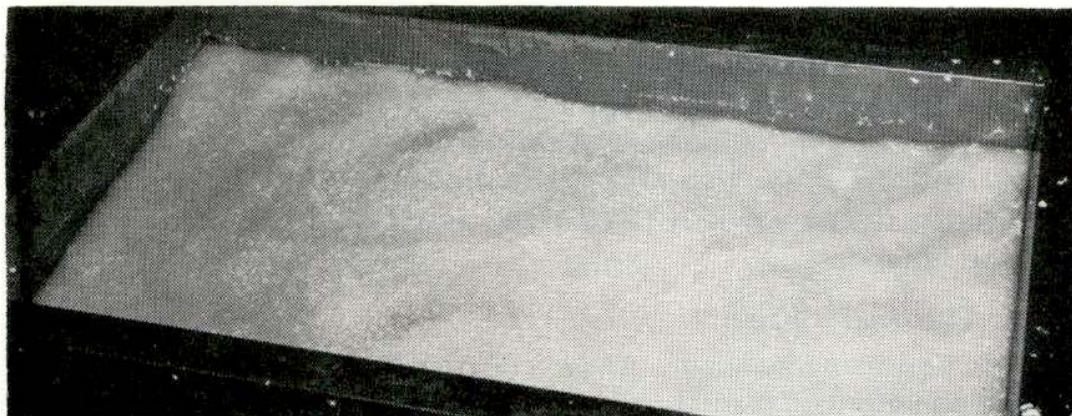


Fig. 1. Finely cut curd floating in whey.

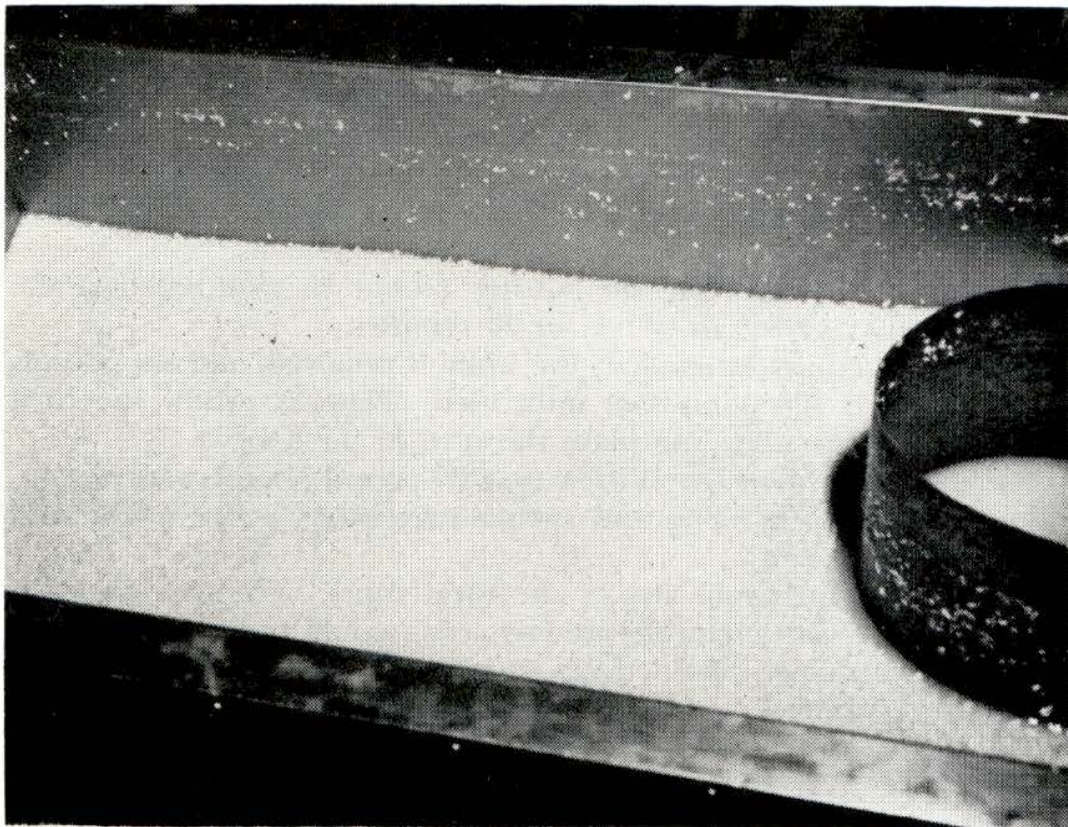


Fig. 2. After one-half whey is removed and salt added.

FLAVORED CHEESES

Variety in flavor of cheese often creates greater interest. The making of short method cheeses which cure rapidly offers an opportunity to obtain variety by adding flavoring materials. The curd of a single batch of cheese can be divided and flavored as desired.

The following suggested flavors may be of interest to the manufacturer and consumer.

Caraway Flavored Cheese

A cheese with caraway seed distributed throughout can be produced by adding two to three ounces of dry caraway seed to each hundred pounds of curd.

The caraway seed should be fresh and as free as possible from mold or other contamination. It is advisable to sterilize the seed just prior to using. This may be done by heating in an oven to a temperature of 300° to 325° F. for two hours and allowing to cool before using.

Sprinkle the sterilized seed over the salted curd just before placing it in the hoops.

Garlic Flavored Cheese

A very pleasing garlic flavored cheese can be prepared by sprinkling one-fourth to one-half ounce of garlic flour over each hundred pounds of curd. This should be added when the curd is salted and should

be well mixed before being placed in the hoops for pressing. The amounts mentioned may be increased if a more pronounced garlic flavor is desired.

Smoked Salt Flavored Cheese

Since the smoking of pressed cheese to give it the desired flavor presents many problems, the use of liquid smoke is preferred. Liquid smoke is sold as "Pyroligeneous Acid."

Sammis (3) reports that the addition of liquid smoke to the curd is not satisfactory. However, the addition to the milk, or to the whey after cutting the curd, was successful. The addition to the milk of .02 per cent, or less, of liquid smoke produced a desirable flavor. A satisfactory smoke flavor has been produced at this station by replacing from one-fourth to one-half the amount of regular salt with a good brand of smoked salt or by mixing one-half ounce of liquid smoke with each pound of salt used.

The flavors suggested by no means exhausts the possibilities of flavoring materials that can be added to this type of cheese. In cheeses which are to be utilized after a curing period of only two to three months there are many possibilities for the preparation of new flavors.

PACKING THE CURD

The amount of curd that will produce a 20 pound cheese after pressing must be determined. Usually $22\frac{1}{2}$ to $23\frac{1}{2}$ pounds of curd weighed into a hoop will give the desired 20 pounds (Plate 3).

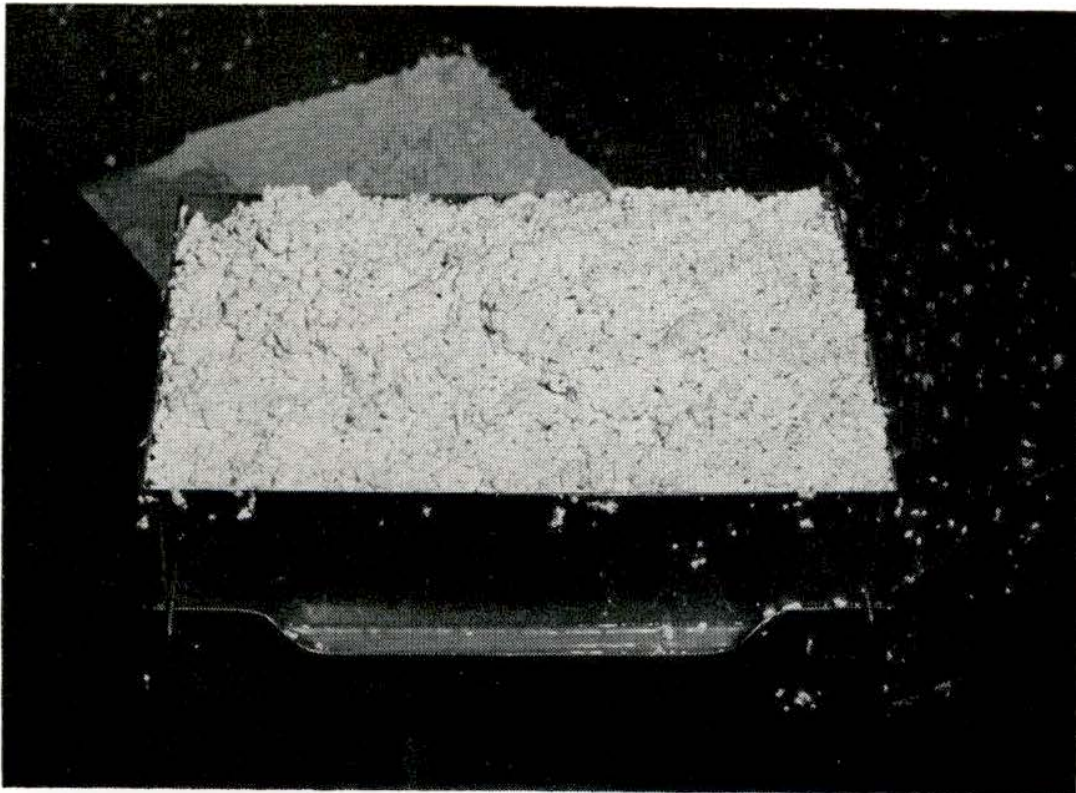


Fig. 3. Salted curd in hoop for pressing.

After the curd has been weighed press it in the Wilson hoop. After a short pressing (30 to 60 minutes) remove from the hoop and wrap in properly prepared press cloths and press overnight. Then remove from the hoop and cloths and wrap in pliofilm and paper. Then place cheese in wooden boxes and press for several hours in a warm room. The detailed description of this procedure and the list of required supplies was given in a previous publication (2).

CURING THE CHEESE

Stack the boxes of cheese in a room at 65° F. for 60 to 90 days. After this warm curing store them at lower temperatures of 40°-50° F. until they are to be cut and sold.

For a mild cheese, 60 to 90 days of curing is sufficient. If a more pronounced cheese flavor is desired, another six months at the lower temperatures will develop more flavor. Cheese can be held a year or longer, if desired, but it should be watched closely and used if undesired flavors develop, or if mold appears on the surface.

PREPARING FOR SALE

The 20 pound loaf of cheese produced by the use of the Wilson hoop is a desirably sized package (Plate 4). When offered for sale it can be readily cut into smaller sizes (Plate 5).

Individual pieces of cheese of the desired size can be wrapped in pliofilm or foil and pressure packed (Plate 6).

Labeling can be accomplished by placing a strip of paper carrying the proper identification and weight around each package. Different flavors can be identified by different colored labels. A variety of different flavored cheeses should interest the consumer.

REFERENCES

1. REICHART, E. L. *and* DOWNS, P. A. 1942. The Manufacture of Cornhusker Cheese, Neb. Expt. Sta. Bul. 342.
2. DOWNS, P. A. 1955. Utilization of Surplus Milk in Small Plants. III. Old Fashioned Sage Cheese. Nebr. Expt. Sta. Cir. 100.
3. SAMMIS, J. L. 1946. Cheese Making. 11th Edition, Mendota Press, Madison, Wisconsin. pp. 255.
4. FEDERAL REGISTER. Feb. 16, 1951. Cheese and Cheese Products. Definitions and Standards Part 19: 510, 535 and 555. Reprint. Food and Drug Administration. Service and Regulatory Announcement. Food, Drug and Cosmetic No. 2. Part 19.



Fig. 4. Parakote wrapped cheese ready for curing.

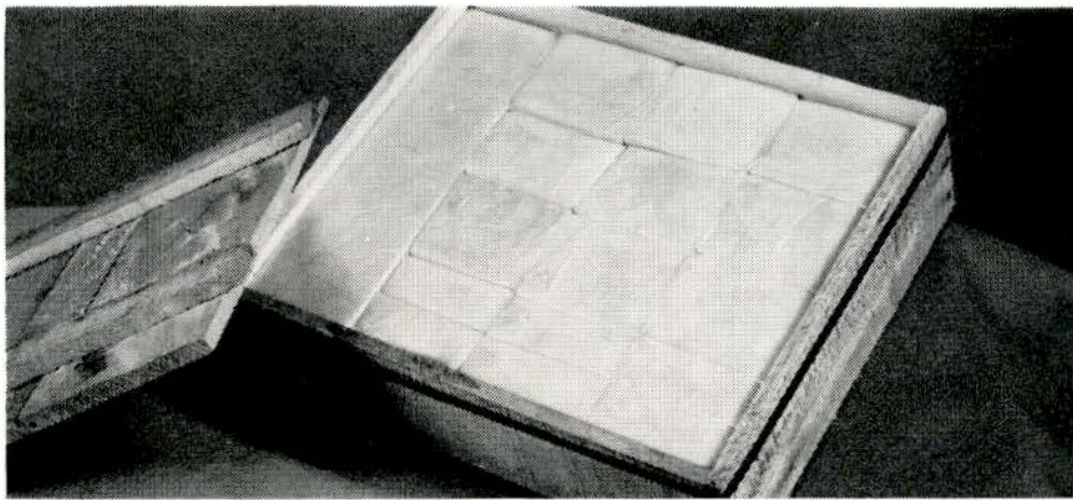


Fig. 5. Twenty-pound cheese cut into different sizes after wrapping and pressing.



Fig. 6. Small units of cheese ready for the consumer.



STIRRED CURD TYPES OF CHEESE

