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### BUTTER-MAKING ON THE ARIZONA FARM

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With the development of the creamery industry, butter-making on the farm has decreased in importance. Some farmers, however, continue to make butter, due to their distance from creameries and to the belief that it is more profitable to make butter on the farm than to sell the cream. Butter-making on the farm saves the expense of delivery of milk or cream, but it involves the expense of ice and butter-making equipment, and it also takes time.

Farm or country butter often has a poor reputation on the market, and commonly brings a lower price than creamery butter. There is no reason why the farmer or dairyman cannot learn to make butter as good as that of a creamery, since he can control the quality of the cream and can have better and fresher cream than most creameries obtain. Good cream must come from good milk. Detailed directions for the care of milk and cream are given in Experiment Station Circular No. 37. By putting out a high-grade product, farm butter-making can be made profitable; and the purpose of this publication is to give essential points in the making of good butter. The information here given is based on the personal experience of the writer in butter-making on the farm and also in the dairy laboratory of the University

*Ripening of Cream*—The flavor and aroma of butter depend very largely upon the ripening of the cream. Ripening means the process of souring or preparing the cream for churning. This souring is brought about by the development of lactic acid, which is a by-product resulting from the growth of certain species of bacteria, commonly called lactic acid bacteria. These bacteria are normal to milk and cream, and their presence is necessary for the development of desirable flavors in butter.

*Ripening Temperature.*—The temperature at which the cream ripens best is between 60 and 70 degrees F. Lower temperatures than this will produce bitter cream, while higher temperatures may produce foul flavors. The cream is ready to churn when it has developed a mild acid taste.



Fig. 1.—A good type farm dairy churn.

*Starters.*—It is a common practice among farmers to use a little buttermilk from the last churning to act as a starter for the next lot of cream. This is the easiest way to provide a starter, and if the buttermilk is good, this method is very satisfactory. However, if the churning is difficult and the butter poorly flavored, a more satisfactory starter is secured by saving four or five bottles of clean milk, which are allowed to sour naturally at 60 to 70 degrees F. until firmly coagulated. The contents of each bottle should be tasted and the one having the cleanest and pleasantest flavor should be used as a mother starter. If more starter is required, this mother starter may be used to inoculate the amount of milk needed to make sufficient starter, which should equal three to ten per cent of the volume of the cream. When this

starter is firmly coagulated it should be added to the cream at least twelve hours before churning.

*Precautions.*—Stir the cream frequently, at least once or twice each day to insure even ripening, and to prevent the curd from settling to the bottom and becoming lumpy. Do not add fresh warm cream to the older cream, as it will injure the flavor of the butter. Sweet cream should not be added to sour cream less than twelve hours before churning, as it will not ripen evenly with the older cream, and a large loss of butterfat in the buttermilk will result.

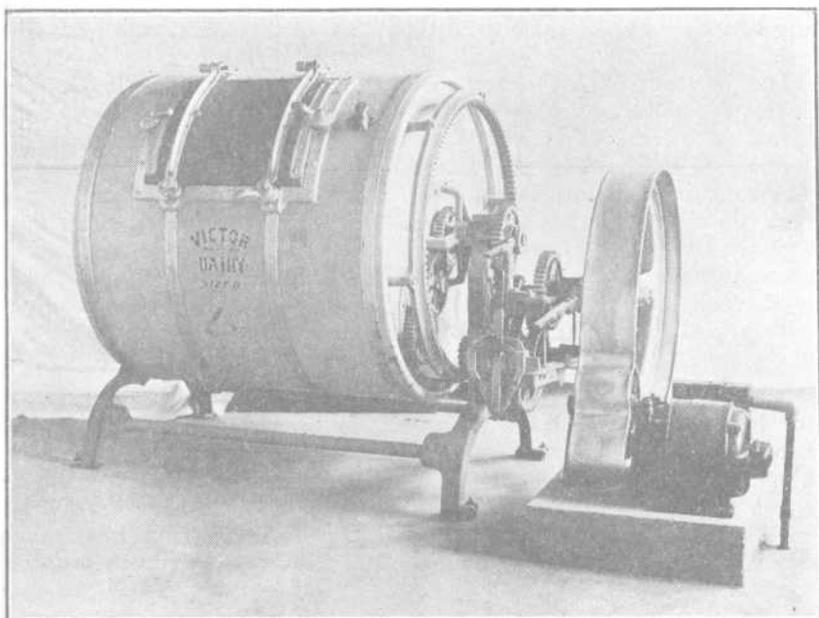


Fig. 2.—A power churn with interior butter-worker.

*The Churn — Its Care.*—For making butter of good body texture, a churn without internal dashers or paddles should be used. Earthenware churns are best for dry climates, but wooden swing and barrel churns are satisfactory if they receive proper care. Just previous to churning, the churn should be scalded and then cooled with water in order to purify it and to prevent the cream from sticking to the sides. If a churn has a sour or musty odor, a handful of lime thrown into the last rinse water will help to remove such odor. A churn can be sweetened by allowing lime water to stand in it over night.

*Temperature for Churning.*—The proper temperature of cream for churning varies with different seasons of the year, the character of feed, the period of lactation, and the breed of cows. As a rule, the tempera-

ture should be about 60 degrees F., in the winter, and from 50 to 56 degrees F. in the summer, and the cream should be held at the proper temperature for at least two hours before churning. If the cream is too warm, the butter will come soft and salvy, it will have poor keeping quality, and there will be a large loss of fat in the buttermilk. If the cream is too cold, it will froth and stick to the churn. It is well to have the temperature such that churning can be completed in from 25 to 30 minutes and that the butter will come in firm condition. A dairy thermometer should be used to aid in controlling the temperature.

*Churning.*—The cream should be strained into the churn to remove any hardened curd. Do not fill the churn more than one-third full, as more cream than this lessens the agitation. If coloring is used, it should be added after the cream is in the churn and before the churning is started. The desirable amount of coloring varies from a trifle to about an ounce per hundred pounds of butter, depending upon the demand of the market, the season of the year, and the breed of cows. The churning should proceed in a manner to secure the greatest agitation. If a tight churn is used, it should be opened two or three times to allow the gas to escape. The churning should be stopped when the granules have reached the size of wheat or corn grains. If the butter is churned into balls, buttermilk will be incorporated, the butter will have a greasy body and a milky brine, and will deteriorate quickly.

*Washing the Butter.*—The buttermilk should be drawn off and as much water added to the butter in the churn as there was cream in the beginning. The wash water should be about the same temperature as the buttermilk; if, however, the butter is soft, the water may be cooler, about 50 degrees F., while, if the butter is too hard, the wash water should be about 65 degrees F. A thermometer should be used to determine temperatures. The churn should be revolved a few times before removing the water. If milky water still escapes from the butter, repeat the washing operation. The purpose of the wash water is to remove the buttermilk and thereby improve the keeping quality of the butter. Butter which is not washed will develop a curdy flavor, while butter which is washed too much may be lacking in flavor.

*Salting.*—Salt serves to flavor and preserve the butter. Different markets require different amounts of salt. Under average farm conditions, six-tenths of an ounce of salt to a pound of butter should be used.

*Working the Butter.*—Butter is worked to distribute the salt uniformly, to remove excess water, and to give the butter a compact, waxy body texture. It may be worked in a bowl with a ladle, or with one of the lever workers. Over-working causes the butter to have an oily or salvy texture and occasionally a fishy flavor. Under-working results in a leaky and mottled butter of loose texture. Butter

should be cool and fairly firm at the time of working. It should be worked until the salt is thoroughly distributed, the butter becomes waxy in texture, and when broken shows granular structure similar to that of broken steel.

*Marketing.*—Butter should be printed or molded, preferably in one-pound rectangular blocks, and wrapped in parchment paper. If a fancy market is desired, it is well to put the butter in special cartons which have printed on them the name of the farm or of the brand of butter, together with statements as to the purity of the product. The brand, style, and neatness of the package help to sell the butter.



Fig. 3.—Butter-worker, printer, and ladles.

*Points in Good Butter Making.*—(1) Use only good, clean cream which has been separated from clean milk and kept cool until ready to ripen.

(2) Ripen the cream at a temperature of 60 to 75 degrees F. by the use of a good starter. Ripening means souring. Use a thermometer to be sure that the right temperature is obtained.

(3) Use a churn which does not beat the cream too much. Scald

the churn with boiling water both before and after churning, and cool it with cold water before adding the cream.

(4) Cool the cream to 50 to 56 degrees F. in summer, or to 60 degrees F. in winter, at least two hours before churning. The temperature should be such that about 25 to 30 minutes is required to complete the churning.

(5) Strain cream into the churn to remove any hardened particles of curd.

(6) Do not fill the churn more than one-third full with cream.

(7) If coloring is needed, add this to the cream after it is in the churn. The proper amount of coloring depends upon the kind of feed and the breed of cows.

(8) If a tight churn is used, put on the cover, revolve the churn several times, then stop and remove the plug to allow the escape of gas. Repeat this operation until no more gas escapes.

(9) Continue churning until the butter granules become the size of grains of wheat. Draw off the buttermilk through a strainer.

(10) Add to the butter while it is still in the churn as much water as there was cream. The wash water should be about the same temperature as the buttermilk, although, if the butter is soft, the wash water may be cooler. Revolve the churn several times, draw off the water and add a fresh supply; repeat this until the water no longer becomes milky.

(11) Remove the butter from the churn, and weigh it, and add six-tenths of an ounce of salt to each pound of butter.

(12) Work the butter until the salt is evenly distributed and the butter is waxy in texture.

(13) If the butter is to be sold, make it into one-pound prints, wrap it in parchment paper, and enclose in paraffined cartons.

*Difficult Churning — Causes and Remedies.*—During the winter and early spring seasons churning is likely to be difficult. By difficult churning is meant a condition in which the butter does not collect after the cream has been churned for 30 or 40 minutes.

There are a number of causes which may contribute to difficult churning, among which may be mentioned the breed of cows, stage of lactation, character of feed, season of the year, thickness of cream, method of ripening cream, churning temperature, and the churning process.

The fat globules of the milk from the different breeds of cows are of different sizes. Those from the Jersey and Guernsey breeds are larger than those from the Holstein and Ayrshire breeds. The larger fat globules of the Jerseys and Guernseys make the cream of these breeds churn easily. This accounts largely for the extensive use of Jerseys as family cows.

After cows have been giving milk for several months, the fat globules in the milk become small and more difficult to collect into

butter by the process of churning. Feeding such cows laxative feeds, such as green forage, lessens this condition, but it cannot be entirely overcome until they freshen again.

Feeds affect the quality of the butterfat. Green feeds produce soft fats which render the cream easily churned, while, on the other hand, cottonseed meal and most grass hays and fodder produce hard fats which make the cream difficult to churn. To overcome trouble of this kind, one should plan his feeding methods so that he has corrective feeds at all seasons of the year.

In winter it is difficult to secure the proper temperature in cream before churning. The hardened fat globules resulting from cold cream will not adhere easily, and therefore churning is difficult.

Cream testing about 30 per cent butterfat churns easily. Thin cream does not churn readily, as the fat globules are far apart. Thick

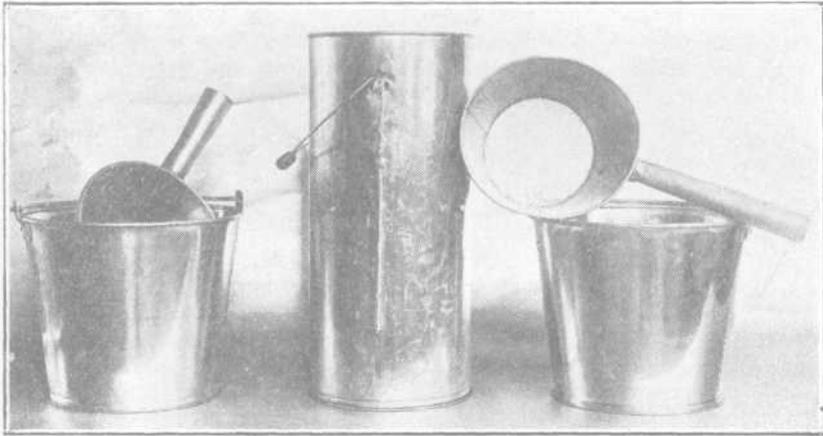


Fig. 4.—Some essential equipment in farm butter-making. Thermometer. Strainer. Shotgun can. 14-quart pails. Large dipper.

cream does not churn easily, as it clings to the sides of the churn and cannot be properly agitated. If the cream tests between 25 and 35 per cent fat, its thickness will be satisfactory.

Proper souring of the cream is an important factor. The souring should be accomplished by aid of a clean-flavored starter, at a temperature between 60 and 75 degrees F. Sometimes cream becomes contaminated by gas-producing bacteria, and when such cream is churned it merely whips and the butter will not gather. Such difficulties can be overcome by rigid sanitary precautions, use of starters, and proper control of temperatures.

Filling the churn too full, or not full enough, will prevent easy churning. There must be an agitation or a concussion to cause the adherence of the fat globules to one another. This concussion will

not be secured if the churn is more than half full, or if it has only a little cream in it. The speed of the churn should be neither too fast nor too slow, but such as to give the greatest agitation to the cream.

*Scoring of Butter.*—Butter is scored on the basis of flavor, texture, color, amount of salt, and its general style and appearance. The requirements of good butter are as follows:

*Flavor.*—The natural flavors of the butter should be well pronounced. They should be mild, distinct, and pleasant. The butter should be free from rancid, curdy, sour, dirty, or any other foreign flavors.

*Texture.*—The body of butter should be firm and waxy. Its texture should be granular so that a broken surface has the appearance of broken cast iron. The more distinctly the granules are marked in the butter mass, the better the texture. The brine coming from butter should be clear and not milky. Butter with a weak body, that is, soft and weak when pressed with the thumb and finger, or butter with a greasy body having no grain, scores low in texture.

*Color.*—The color of butter should be a clear, bright, uniform, golden yellow such as is naturally produced when cows are feeding on green pasture. The demand of the market in different parts of the country varies considerably in regard to the shade of color desired.

*Salt.*—Butter should be salted according to the demand of the trade. In any case, salt should be completely dissolved and uniformly distributed.

*Appearance.*—Butter should be put up in a neat, attractive form. The following scale of points is ordinarily used in scoring butter:

Flavor .....	45
Texture .....	25
Color .....	15
Salt .....	10
Appearance .....	5
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Total .....	100