

Montana Extension Service in Agriculture and Home Economics

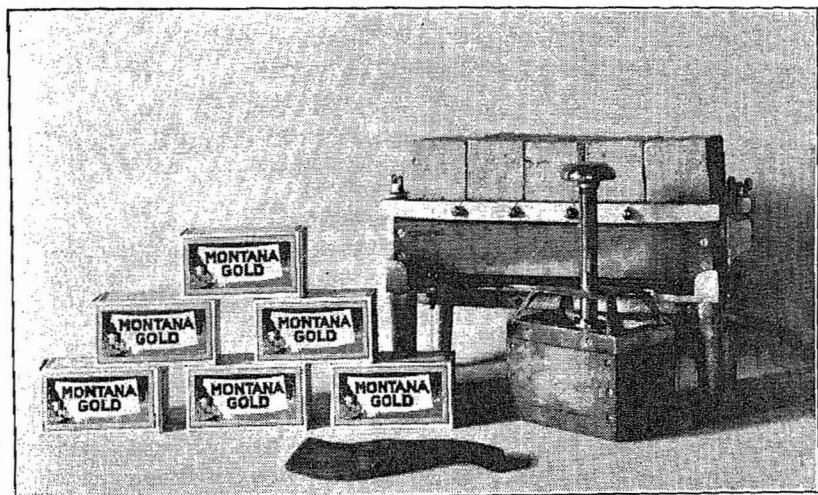
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Making Butter on the Farm



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Making Butter on the Farm

The most important factor in making good butter is to have first class milk, then keep the products clean and cool from the milk room to the breakfast table.

The sources of contamination of milk and cream are the body of the cow, the stable, the milker, the dust from the air, also unclean strainers, milk utensils, milking machine and cream separator. The contamination from some of these sources is not only filthy in itself but it carries with it innumerable bacteria which find the milk an ideal place in which to grow, multiply and develop undesirable odors and flavors.

A small top milk pail reduces the opening so less dirt and fewer bacteria can enter to contaminate the milk. All dairy utensils need to have the inside seams and joints made smooth and filled with solder. This will prevent lodgment of dirt and will allow thorough cleaning. The use of wooden pails or containers is not advisable. Wood is porous, and absorbs the milk readily, which makes it next to impossible to keep clean. Rusty or corroded tin may impart a metallic flavor to the products and is hard to keep clean. The same is true of galvanized iron.

CLEANING

The proper way to clean milk utensils is to rinse first with luke warm water then wash in hot water to remove the oil and sterilize with scalding water or steam to destroy the germs. If scalding water is used first it will cook the casein of the milk making it glue fast to the surface so it cannot be removed. A little sal soda or one of the better dairymen's washing powders is very effective in cleaning dairy utensils. A good way to tell when a milk can is clean is to wash, drain, then put the cover back on tight and set it in a warm place for a few hours. If it is not clean an offensive odor will be easily detected when the cover is removed.

STRAINING

The best strainer for dairy purposes is one made of cheese cloth or cotton batting. A cloth may be thoroughly washed, dried and used again but fresh cotton has to be used each time. The

constant use of a milk strainer is by no means a substitute for clean methods of producing milk. If dirt once enters the milk, the greater portion of it readily goes into solution which makes it impossible to remove even with a strainer.

SEPARATING

It is best to separate the milk immediately after milking. The separator will do the most efficient work when the milk is warm; besides it permits the cooling of cream immediately. Cooling is very important to prevent bacterial development.

In case the milk become cold before it is separated, it must be rewarmed to about 85° F. otherwise the average separator will fail to recover all of the butter-fat from the skim milk. Butter-fat readily becomes firm below 92° F. which causes the cream to stick to the separator unless the parts are warmed before using. A good plan is to run a quart of hot water through the machine before turning in the milk. Cold milk will clog the cream outlet making the cream too thick and causing a loss of fat in the skim milk.

The speed of the separator bowl is another important factor. It has to create a force sufficient to separate the cream from the skim milk otherwise butter-fat will be lost. In turning the machine, a uniform speed is quite necessary to efficient work. The proper speed is usually indicated on the handle of the machine.

It is not a good plan to tamper with the cream screw. The average machine will skim about the same from day to day if it is kept clean and the milk is properly tempered. A good thickness for cream is from 30% to 35%. This will churn easily and makes less bulk to handle and store. Flush the separator bowl after the milk has been run through in order to remove the cream. A quart of warm water or skim milk will force the cream from the bowl and prevent unnecessary loss of butter-fat.

Perfect cleanliness is essential in using a hand separator. A dirty machine will contaminate the cream and the skim milk which materially lowers the grade of the cream and of the butter made from it. A machine left dirty for several hours allows the casein to adhere to the parts sufficiently to prevent efficient work and will be difficult to clean. All parts coming

in contact with the milk need to be cleaned each time after using to prevent corroding of the metal.

In washing the separator, care is necessary to dip the parts first into luke warm water and clean with a brush to remove as much of the casein as possible after which hot water or live steam will serve to remove the fat and to sterilize the parts. After washing, it is well to put the parts in a warm place to dry. This will prevent rusting and will add both to the life and to the efficiency of the machine.

COOLING THE CREAM

In order to make first grade butter it is necessary to cool the cream to 50° F. immediately after separating and hold it there until time to churn. A good plan for keeping the cream cool and sweet is to cut a barrel into halves or make a vat of sufficient size to hold several cans, then place this between the pump and the watering trough. This plan will insure a fresh cold supply of water about the cans at all times. The setting of cream into an ice box, a cave, a cellar or a pantry is not a very good plan from the fact that ventilation is usually poor and bad odors are present. These are very readily taken up by the cream and cause undesirable flavors in the butter.

PREPARING CREAM TO CHURN

The best butter is made from sweet cream but it requires a longer time to churn, and usually more fat is lost in the butter milk. Sweet cream butter is growing in popularity both on the farm and in the factory.

It is customary to ripen cream by bringing the temperature to about 70 degrees. The cream is then allowed to sour naturally or by adding a starter of clean flavored sour milk or a pure culture of lactic acid bacteria. The souring of cream is similar to the change which takes place in the fermentation of fruit juice. Bacteria feed upon the fruit sugar and change it to acid. In the very same way, they feed on the milk sugar in the cream and change it to acid.

THE CHURNING POINT

A good way to tell when cream is sour enough to churn is by the taste and the appearance. Sweet cream will usually have a clean pleasant, nutty flavor and the surface will appear yellow,

smooth and soft like velvet. Ripe cream when ready to churn will have a clean, pleasant, sour taste and will appear more white and shiny with bubbles on the surface after stirring. Over-ripe cream will have a sharp acid taste with a rancid, fermented or other undesirable flavor which invariably will ruin the flavor and keeping quality of the butter.

PREPARING THE CHURN

It is well to prepare wooden churns by scalding with hot water. This will close the pores and mechanical crevices, destroy germs and remove the undesirable odors. The cream and the butter milk will stick to the sides of a dry churn, make it difficult to clean and is liable to impart bad odors to the butter. After a few turns the hot water can be removed and the churn cooled with cold water before adding the cream. Unless this is done, the temperature of the cream may be raised sufficiently to greatly injure the quality and texture of the butter.

In cleaning the churn after using, it will need to be rinsed with cold water first to remove the butter-milk and scalded with hot water to remove the butter fat particles, then left uncovered so the heat will dry it out and prevent the growth of must or mold. Never use a cloth on the inside of a churn. If any scouring is needed use a brush.

In case the churn develops a bad odor, as it often does when kept closed or in a damp place, a good plan is to rinse it out occasionally with lime water. This will keep it sweet and sanitary.

TEMPERATURE

The temperature of the cream is a very important factor in churning. It has a decided influence on the texture and quality of the butter and on the time required to churn. A high temperature of the cream is conducive to quick churning but the butter will have a soft greasy texture with a tendency to incorporate butter-milk which injures the flavor and the keeping quality of the butter. Too low a temperature will tend to prolong the time of churning as cold cream is more viscous, and the butter-fat globules are firmer, making it difficult for them to gather in the churning process.

The proper temperature of the cream in churning will vary according to the season of the year, the richness of the cream

and the kind of feed the cows are receiving. In the summer when the cows are on pasture or when they are fed silage, roots and other succulent feeds, the butter-fat is rather soft and calls for lower churning temperatures. Likewise when cows are given dry feeds in winter the butter-fat becomes harder making it necessary to raise the churning temperature. The range in temperature will vary from 50 degrees to 62 degrees F. with about 56 degrees F. as a good churning average. The common practice of churning above 60 degrees came about when people skimmed thin cream by hand but with the advent of the hand separator thicker cream is skimmed which makes lower temperatures advisable and necessary.

FILLING THE CHURN

It is well to always strain the cream into the churn as a precaution against insects, dirt or lumps of curdy milk. The best results are obtained where the churn is filled from a third to one-half full. If the churn is too full it reduces the concussion or the force with which the cream strikes the other end of the churn on being agitated and prolongs the time of churning. It may cause the cream to foam and swell which often necessitates the removal of a portion in order to allow the butter to churn.

COLORING

The average market demands butter of a uniform light, straw color. In order to get this it may be necessary to add artificial coloring to the cream. The amount of color depends upon the breed of cows, feed of the cows and season of the year. The butter-fat from the Jersey and Guernsey cows usually is a deeper yellow than from the other breeds and requires less coloring. Often in summer when the cows are on grass the butter will be sufficiently yellow to need no artificial coloring. In the late fall or winter when cows are on short pasture or are given much dry feeds, it frequently is necessary to use about 25 drops to a gallon of cream. The important point is to vary the amount of coloring in order to maintain a uniform straw color of the butter throughout the year. If for any reason the coloring is left out of the cream before starting to churn it may be added by mixing with the salt.

SPEED OF CHURN

The butter-fat exists in the cream in minute globules. These float about until the force of agitation due to churning brings them together. The proper speed of the churn may be determined by the operator when the cream reaches the greatest impact in the churn. The concussion has to be sufficient to bring the fat globules together with sufficient impact to cause them to cohere in flakey masses which continue to grow in size until they are separated from the butter-milk.

STOP CHURNING

If the cream contains about 30% of butter-fat and is of the proper churning temperature, the butter will churn in about 30 minutes and when sufficiently gathered will appear in open flakey masses somewhat like popped corn. In this condition, the butter will allow more thorough removal of the butter milk. Overchurning gathers the butter into lumps, incorporates the butter milk and prevents thorough washing which injures the flavor, the texture and the keeping quality of the butter. If the churn is stopped too soon many small particles of butter-fat will be lost in the removal of the butter milk.

WASHING

After thoroughly draining the butter milk, wash the butter with clean pure water tempered to about the same degree as the butter milk. If the butter granules are too soft or too hard, they may be tempered accordingly by adjusting the temperature of the wash water. A dairy thermometer and a pail will insure accuracy in tempering the wash water. Two washings are usually sufficient but it is well to continue until the water runs clear.

WORKING AND SALTING

The only satisfactory way to make butter on the farm is to have a modern combined churn and worker, which may be operated either by power or by hand. They not only relieve the drudgery of butter making but churn more quickly and exhaustively and will work the salt into the butter more uniformly without injury to the quality or the texture of the butter. If a combined churn is not used, the butter will need to be removed to a worker after washing, spread out evenly and salted. The

average butter market calls for about $2\frac{1}{2}$ per cent of salt. This will require the addition of about one ounce per pound of butter-fat. It is well to sift the salt free from lumps then sprinkle evenly over the butter and work it in thoroughly. Mottles and waves so common in butter are often due to uneven salting and uneven distribution of the moisture. To insure even color and to prevent overworking of the butter it is a good plan to add the salt to the butter, then work enough to get it well mixed and let the butter stand for a few minutes in order to allow the salt to thoroughly dissolve, after which rework a trifle. Another way is to measure out the salt into a pan then, wet thoroughly before adding to the butter. This will insure against mottles and grittiness so common in farm butter. It is extremely easy to overwork butter, especially when made in small quantities or when the butter is soft. Overworking is to be avoided as it destroys the grain and makes the butter gummy or salvy in texture which injures the market value of the product.

PACKING

The quality and appearance of the butter in the final package are a true index of the quality of the cream, the cleanliness and the neatness in every detail of manufacture, which accurately reflect the knowledge, skill and application of the maker. If the butter is of the proper firmness it is best to print it directly from the worker to insure against contamination. In case it is too soft it will need to be tempered before printing in order to prevent loss by leakage or crumbling. The best package for marketing is one that is neat in appearance, convenient to handle and efficient in preventing contamination or loss.

The print has come to be the most popular consumer's package for butter. In size, it may range from a quarter of a pound to two pounds. Butter printers of various types are on the market and may be obtained at a small cost. After printing, the butter is wrapped in parchment paper and put into a pasteboard carton. This prevents contamination, preserves the butter and serves as a convenient package which does not have to be opened until it reaches the consumer's table. In accordance with the Federal Pure Food regulation all individual packages must carry the net weight of the contents. The carton serves this purpose and may also carry a trade mark or other advertising.

DIFFICULT CHURNING

The two main causes of difficult churning can be traced usually to either an abnormal condition of the cream or to faulty methods of making the butter. Often in the advanced stage of the lactation period, a cow will produce butter-fat with extremely small fat globules which gather with difficulty. Occasionally the cream will be infected with abnormal bacteria which will cause it to foam in the churn or affect it otherwise. In the fall and winter when cows are put on dry feed the butter-fat becomes harder especially when there are strippers in the herd.

Other causes are skimming the cream too thin or too thick, trying to churn it too sweet, filling the churn too full, trying to churn the cream at too low a temperature or not securing the proper speed of the churn.

These difficulties usually can be overcome by feeding the cows on silage or roots, separating cream having about 30% butter-fat, ripening it properly and churning at a little higher temperature. If the difficulty still persists, add a handful of salt to the cream or set the rollers in gear if using a combined churn. If the cause is from abnormal milk, it may be necessary to churn the cream from each cow separately to learn which one is causing the trouble. Where cream is from a herd of several cows or from a number of herds as at the creamery, these difficulties seldom occur. When cream needs to be warmed, never add hot water to the churn but remove the cream and warm to the desired temperature, then return it to the churn.

EXHIBITING

Butter intended for exhibition needs to be made from the very best cream, put into jars, neat prints or fancy designs and kept perfectly cool. In preparing a jar, fill it level full then cut the butter even across the top with a piece of cord. Cover the jar with a clean white cloth circle cut to fit it, over which place a tough paper and secure with a string. If prints are to be exhibited, they will need to be neatly made, then wrapped with parchment paper and placed in a carton.

MARKETING

A good way for the dairymen to market butter is direct to the consumer. This plan usually nets the largest returns, for a high grade reliable article will soon create a fancy local trade which will warrant a premium above the average market price. The kind and the appearance of the packages are good advertisements as the average consumer judges an article of food very much by the appearance.

The markets are beginning to demand that butter be put up in small packages such as pound prints, squares and fancy molds. These do not have to be broken, are convenient to handle without contamination, loss from leakage or loss in weight. The butter can be wrapped in neat parchment paper and enclosed in cartons printed with attractive labels. A brand or trade mark as "Golden Valley Dairy" lends dignity to the business and frequently is a stronger selling factor than the quality of the goods.

The parcel post is rapidly coming into use in marketing farm butter direct to the consumer. Farmers Bulletin No. 930 which may be obtained from the Department of Agriculture in Washington, D. C., gives valuable suggestions on how to prepare butter for parcel post shipment.

JUDGING BUTTER

The different butter markets require some standard of perfection whereby certain qualities in the butter can be measured and compared. This has led to the adoption of a system of scoring based upon flavor, texture, color, salt and package with relative values attached to each point as follows:—

Flavor	45
Texture	25
Color	15
Salt	10
Package	5

The butter judge uses a trier to remove a plug from the package to be scored. The sample on the trier is held close to the nose immediately after being withdrawn in order to detect the aroma or odor. The aroma of good butter is very delicate and passes away soon after the sample is removed from the package.

FLAVOR

The flavor is the most important quality in butter and is determined by the sense of smell and by the sense of taste. The judge combines these two and notes the defects to form a judgment on flavor.

Perfect. The flavor in the highest grade of butter made from the very best cream is described as being clean, sweet, and nutty. It has a pleasant, delicate aroma, characteristic of clean well ripened cream.

Unclean flavor results from dirty pails, strainers or other utensils, or from careless methods of handling the milk.

Rancid flavor is caused by over-ripening cream. When the milk, cream or butter is kept too long especially in the sunshine it develops rancidity.

Curdy flavor is due to adding over-ripened starters to the cream or to incomplete removal of butter milk when washing the butter.

Weedy flavor is due to the cows eating weeds in the pasture. It may come from feeding the cows onions, cabbage, turnips, or by exposing the milk or cream in surroundings where objectionable odors are present.

Oily flavor may result from churning the cream, washing or working the butter at too high temperatures. It may result from using too much or too old butter coloring. The cause is likewise attributed to certain species of bacteria.

Cowy flavor suggest animal odors and may appear in the spring when cows are first turned to pasture. It appears in the milk used from a cow that is sick or in a feverish condition or from an unclean stable.

TEXTURE

The texture refers to the grain and the body of the butter. It is determined by the appearance or feeling of the sample on the trier. The globules of fat cohere to one another rather loosely and irregularly during the churning. They retain this same position, which forms the body of the butter in the finished product unless the cream is churned too warm or the butter washed and worked improperly.

Perfect texture allows the butter granules to retain their individuality and when broken apart the fractured ends will appear like a piece of broken steel. It also allows the back of the trier to be free from a greasy appearance when withdrawn from the sample. A good texture will show firmness under the thumb when examined at ordinary temperatures.

Salvy texture is due to washing or working at too high temperatures or to over-working the butter. It destroys the grain and makes the butter appear sticky or greasy and pull apart like gum.

Tallowy texture results from the presence of much hard fats in the butter fat, from cows long in lactation or from chilling the butter with extremely cold water.

Poor grain refers to the lack of proper mechanical methods in making the butter.

Weak body refers to butter which is soft and salvy in texture and in which the moisture is high or not thoroughly incorporated. It may be the result of feeds the animal receives, as grass, or too high temperatures.

COLOR

The natural color of butter varies from a light straw to a deep yellow, depending upon the breed of cow, feed of the cow and season of the year. The average markets demand a light straw color similar to that produced by June pasture. A uniform color is demanded which makes it necessary to use artificial coloring in varying amounts.

Perfect color is a lively straw yellow, uniform and solid throughout.

Mottles are uneven colors of light and dark in spots, waves or streaks. The high colors are caused by the attraction of moisture from the undissolved salt. The light portions may result from the action of the salt upon the butter milk remaining in the butter.

White specks are due to particles of casein resulting from over-ripening the cream, from over-ripe starter or from dried particles of cream caused from lack of stirring during ripening.

SALT

The quantity of salt varies from none to one or two ounces per pound of butter. The important thing is to have the salt uniformly distributed and thoroughly dissolved.

Flat is a term used to describe butter when lacking in salt.

Gritty refers to undissolved salt and is a most objectionable defect.

PACKAGE

This refers to the appearance of the butter on the market. The trade desires a neat, clean, attractive package in tub, jar or print.

PACKING FOR STORAGE

In packing and storing butter for winter, use only selected cream of the finest flavor. Ripen and churn carefully, taking particular pains with the temperatures, then wash out the butter milk thoroughly. Butter may be packed in either salted or unsalted condition to suit the desires of the trade.

A jar is a good container in which to pack butter. The jar will need to be scalded thoroughly to destroy all germ life, then placed bottom side up to drain and exclude all floating germs before the butter is packed. The butter may be made into prints or placed in layers two or three inches thick with a layer of dry salt between. This facilitates the removal of the butter. Another way is to pack the jar solidly until within a half inch of the top, then place a sterilized cloth over it and cover with a layer of dry salt, paraffin or, better still, submerge the entire jar in a brine solution.

MAKING THE BRINE

In making the brine, boil the water until all germ life is destroyed, then add about one-fourth ($\frac{1}{4}$) as much salt as water. The brine should be strong enough to float an egg.

The jar of butter may be put into a larger jar and covered with a weight to hold it down then the brine added until the jar is full. In order that the butter may not become exposed, add brine occasionally as it evaporates. Store the butter in a cool cellar or in a cool room, as the butter will keep much longer and better than where it is kept warm.